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INDIA

Editorial

The prospects of an imminent world food shortage, and the inadequate supply of fossil, fuels and other critical minerals to support the world economy, seem to be self-evident. The growth of human population is the principal and most compelling threat to the survival of the species. The growth rate has increased sharply during the 19th century and has become startling. Modern civilization, sense of cleanliness and hygiene have brought down the mortality rate. It has failed to initiate the kind of economic development and spontaneous decline in fertility. The result is that, while population has been growing at 2 per cent and agricultural production by 2.5 per cent, world demand for agricultural products has been growing at 3 per cent per year. That differential represents an evergrowing number of hungry mouths.

Despite the world's information net work, the remarkable world-wide transportation system, and the prolific yields of modern agriculture—available indications suggest that the death toll due to starvation in this Century, indeed in the next few years, will set in all-time high. The high hopes offered by Green Revolution have effectively been washed away by the rise in oil price, which has driven up the price of nitrogen fertilizer resulting in loss of enough grain to sustain people.

The problem today is not that the world agriculture cannot provide minimal sustenance for the world's population; the problem arises out of the inadequacy of agriculture in the fast growing populous developing nations and the operation of the world-wide food distribution system as a market economy. The proposed World Food Bank/Grain Bank is a device to mitigate to some extent crop analogy in any part of the world. This could be a success if the people of the developed nations impose self-restraint on their consumption. It is extremely doubtful that the enhanced agricultural productivity will be able to keep pace with the population growth, unless there is a marked decline in the growth of population in the developing nations. The fruits of science did much to make our civilization worthwhile. Now the burden to provide capital and technical assistance to the people of the developing nations so as to enable most, to feed themselves, falls upon the industrialised world. The scientists are to lend a helping hand for the performance of the relevant fundamental research.

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PREPARATION OF CIDER FROM COMMERCIAL APPLE VARIETIES OF JAMMU AND KASHMIR—YEAST STRAIN AND VARIETAL DIFFERENCES IN THE PHYSICO-CHEMICAL CHARACTERISTICS

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(Department of Microbiology, Punjab Agricultural University, Ludhiana, India)

Summary

The cider preparation study was conducted with two Kashmiri varieties of apple, Red Delicious and Maharaji employing three yeast strains (Y_1, Y_2 and Y_3) at two sugar levels (16 and 24 per cent) and three nitrogen treatments: N_1, N_2 and N_3 (0.05, 0. 10 and 0.15 at 16 per cent sugar and correspondingly 0.075, 0.150 and 0.225 at 24 per cent sugar level). On the basis of physico-chemical, microbiological and organoleptic evaluation, it was concluded that both the apple varieties were suitable for cider making. It was observed that yeast strain Y_1 gave better results as compared to Y_2 and Y_3 for the production of alcohol (though the pattern of sugar utilization by all the strains was unusual). A sugar: nitrogen balance of 16:0.1 per cent (correspondingly 24:0.15 per cent) was found to be the best in the fermentable juice.

Apple (*Malus sylvestis*) is commercially cultivated as an important fruit crop in the Jammu and Kashmir State occupying about three-fourths of the total area under temperate fruits. Till 1973-74 only 40 per cent of the total area under apple orchards had reached commercial bearing stage, so the production of apple is sure to be doubled in near future. Kashmir thus foresees prospective apple industry.

Apple growers are facing problems in disposing off their product because of the climatic conditions, topographical situation and inadequate transport facilities especially during seasonal glut. Utilization of apple in cider manufacture will definitely solve the problem and thus save a large quantity from spoilage.

Material and Methods

Extraction of juice: Two juicy and high sugar containing varieties of apple commercially cultivated in Kashmir State were selected for the preparation of cider. The graded sound fruits from each variety were washed, dried, quartered, cored and crushed in a fruit crusher. Sulphur dioxide (SO_2) as potassium metabisulphite at 200 ppm was added during crushing process. The crushed pulp was treated overnight with 0.5 per cent (v/w) of liquid pectinase and

* Fruit Research Station, Udheywalk, Jammu, P.O. Akalpur 180002 (J & K State).

subsequently obtained the juice with a basket press.

2. *Analysis of juice:* Specific gravity, ash, pectins, reducing sugars and non-reducing sugars were determined by the standard methods (AOAC, 1961), tannins, phosphorus and nitrogen by the method of Amerine *et al.* (1967), Vogel (1964) and Plummer (1971), respectively. The total soluble solids (TSS) were determined by Erma Hand Refractometer and pH by Beckman pH meter.

Amelioration of juice: Sugar content in the juice was raised to 16 per cent (S_{16}) and 24 per cent (S_{24}) for each variety by extraneous addition of sugar. The sugar fortified juice was distributed into four sub-portions and was supplemented with urea to give sugar nitrogen ratio as 16:0.05; 16:0.10; 16:0.15, fourth served as control. The corresponding ratios at 24 per cent level were maintained as 24:075; 24:0.15 and 24:0.225.

Fermentation of juice: The juice was fermented at 27°C with three selected strains (Y_1, Y_2, Y_3) of yeast (*Saccharomyces cerevisiae* var. *ellipsoideus*) obtained from the Department of Microbiology, PAU, Ludhiana. The fall in the brix was noted every day and when no further reduction in brix was noted for three consecutive days, the clear fermented liquid was siphoned out and stored at 4-5°C for 24 hrs to sediment yeast cells and precipitate protein.

Clarification and storage of cider: For further clarification, the cider was filtered through Whatman No. 44 under vacuum. The cider thus obtained was filled in 650 ml capacity bottles and pasteurized at 65°C for 30 minutes followed by immediate cooling and stored at room temperature for 6 months.

Analysis of cider: Specific gravity, TSS, pH, total acids, pectin, reducing and non-reducing sugars, tannins and phosphorus were determined with the same procedures as used in analysis of the apple juice. While alcohol content, sulphur dioxide, volatile acidity and esters were estimated by the methods of Amerine *et al.* (1967).

Microbiological analysis: The total bacterial and fungal counts were determined by the standard procedure (APHA, 1967).

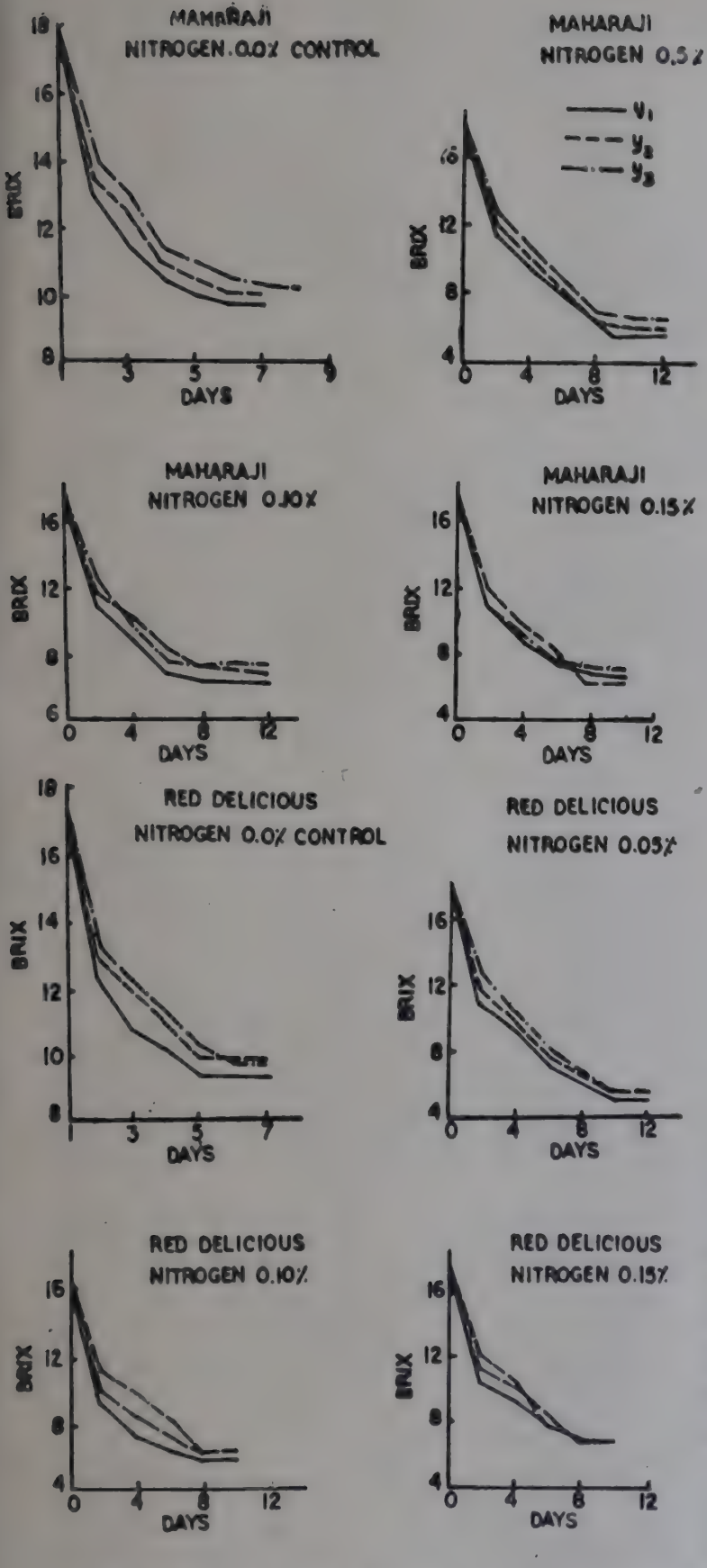
Organoleptic evaluation: The cider from both varieties and different treatments was presented to a panel of judges to determine the suitability for table purposes. Only mean values for sensory evaluation have been presented and discussed.

Results and Discussion

The composition of the juices is presented in Table 1. The juice content, 86 per cent and 79 per cent for *Maharaji* and *Red Delicious* varieties, was comparable to that of European cider apple varieties (75-85 per cent) reported by Holfelder (1970). The specific gravity of juices (1.046 and 1.067) was also in accordance with values of Burroughs (1961) and Pollard (1971).

TSS content of *Red Delicious* was 17.5 (16.04 per cent sugar) which was more as compared to 12.5 (10.91 per cent) of *Maharaji*. Total acids were more in *Maharaji* (0.729 per cent) than *Red Delicious* (0.20 per cent), while pH was 3.0 and 3.65 respectively. The values determined were, however, in the range as given by Burroughs (1961). The tannin and nitrogen contents in both the varieties were low. These values are however in line with those reported by Nagi and Manjreker (1976).

The efficiency of sugar utilization and fermentation behaviour of yeast cultures have been represented graphically (Graph 1-2). The unusual pattern of sugar utilization by all the strains may be due to temperature fluctuations during fermentation period. However, the rate of fall of brix indicated that strain Y_1 was a faster sugar fermenter than strains Y_2 and Y_3. The fermentation took 7-10 days.



SUGAR UTILIZATION BY YEAST CULTURES AT 16% SUGAR

TABLE 1. *Analysis of apple varieties*

Composition		Apple varieties	
		Maharaji (M)	*Red Delicious* (RD)
A. *Apple*			
Juice content % v/w		86.00	79.00
B. *Juice composition*			
Specific gravity		1.046	1.067
TSS °Brix		12.5	17.5
pH		3.00	3.65
Ash	% w/v	0.129	0.123
Pectins	,,	0.529	0.389
Reducing sugars	,,	10.00	14.28
Non-reducing sugar	,,	0.91	1.76
Total acidity (as malic acid)	,,	0.729	0.208
Tannins	,,	0.082	0.068
Nitrogen	,,	0.0060	0.0092
Phosphorus mg	%	18.08	16.60

The sugar utilization of S_{16} and S_{24} in both the varieties was highest in N_1 followed by N_2 and N_3 nitrogen treatments. The control exhibited high degree brix, showing nitrogen indispensability of the yeast culture for successful completion of the fermentation. Yang (1953) and Luthi (1957) have also reported the necessity of adding nitrogen in the form of urea or ammonium phosphate for fermentation.

Two rackings followed by vacuum filteration through Whatman No. 44 gave sparkling and attractive cider. The technique took less time and was economical over other techniques (Barker and Grove, 1930).

The pasteurized cider bottles were crowned with pith corks to help slow oxidation

and were aged for seven months (Nov. 1974 to May 1975) at room temperature (21°C).

Cider analysis: The values for the physico-chemical characteristics for various treatments have been presented in Tables 2-4.

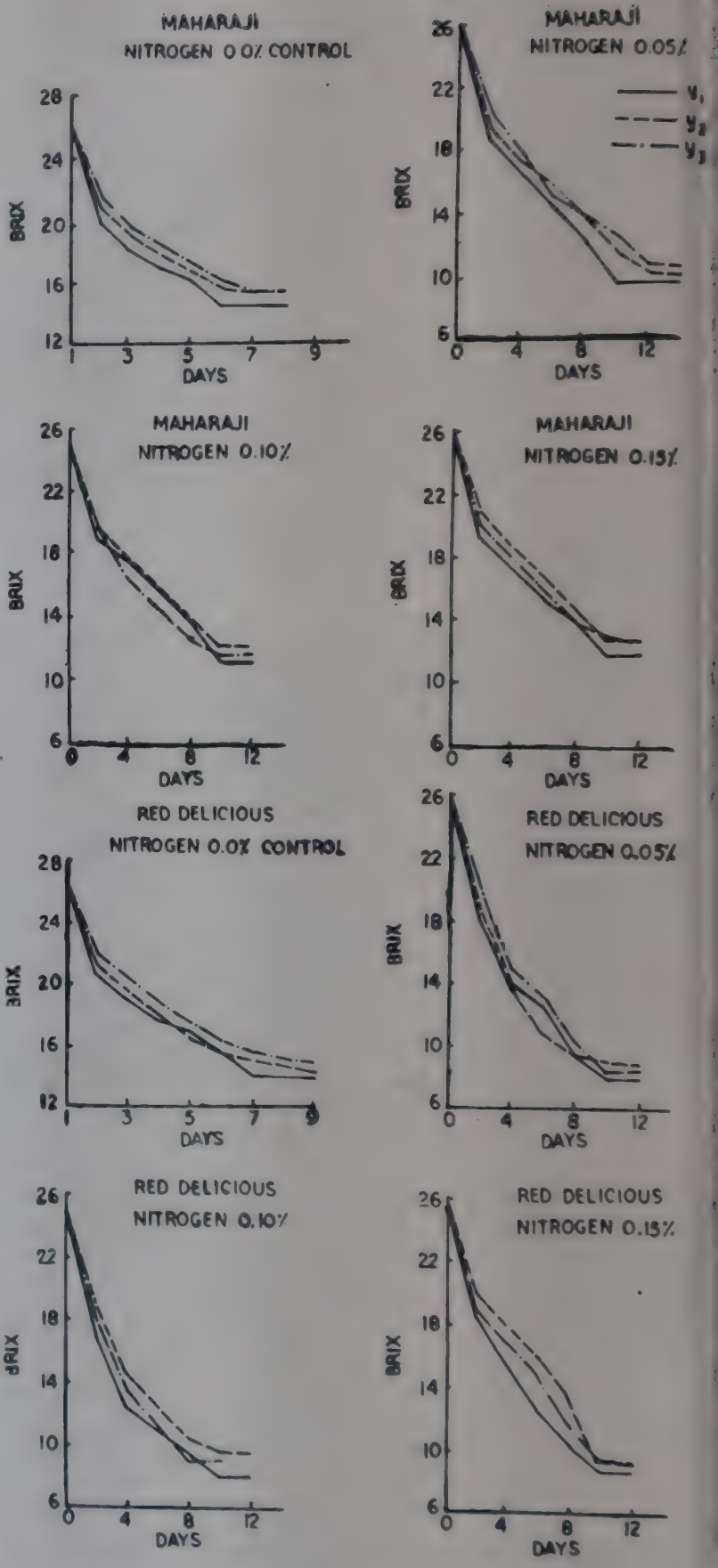
Specific gravity and total soluble solids (TSS): The means of specific gravity and TSS of ciders obtained from S_{16} were non-significant but of ciders from S_{24} varied significantly between apple varieties probably due to different cultures and nitrogen treatments. The control samples in both the varieties yielded ciders of high specific gravity and TSS which may be due to lack of nitrogen required for the yeast. But high TSS and specific gravity values in ciders resulting from nitrogen supplemented samples of S_{24} could be ascribed to inability of the yeast strains to convert the sugar into alcohol.

pH: The pH of the ciders prepared from *Maharaji* and *Red Delicious* apple juices varied from 3.19-3.45 and 3.66-3.85, respectively. The low pH of the former and the high pH of the latter were due to the corresponding preparations from sharp and sweet varieties of apple.

Ash: The ash content was significantly higher in control cider than nitrogen treated samples at both levels of sugars and in both the apple varieties. It is clear from the data that the two apple varieties varied in the ash content (0.20-0.82 per cent) due to yeast cultures and nitrogen treatments. The range was higher than the one reported by Smock and Neubert (1950).

Pectins: The pectin values in *Maharaji* (0.136-0.148 per cent) and *Red Delicious* (0.119-0.136 per cent) were almost the same as reported by Nagi and Manjrekar (1976).

Total acidity: The total acidity in the ciders prepared from *Maharaji* apple (0.644-0.737 per cent) was significantly higher than the ciders from *Red Delicious* variety (0.207-0.327 per cent). The samples with more than 0.5 per cent acidity needed further



SUGAR UTILIZATION BY YEAST CULTURES AT 24% SUGAR

TABLE 2. *Effect on physico-chemical characteristics of ciders due to yeast (mean values)*

Strains	Sugar levels	Specific gravity		TSS %		pH		Ash %		Pectin %		% Total acidity		% Volatile acidity		Total sugars %	
		M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD
Y_1	S_{16}	1.0082	1.0063	7.12	7.00	3.28	3.78	0.15	0.27	0.143	0.129	0.676	0.276	0.018	0.029	1.346	1.411
	S_{24}	1.0324	1.0090	11.87	9.75	3.34	3.81	0.75	0.43	0.140	0.129	0.671	0.319	0.037	0.045	4.451	2.737
Y_2	S_{16}	1.0092	1.0063	7.56	7.37	3.29	3.79	0.37	0.28	0.143	0.128	0.694	0.315	0.018	0.027	1.128	1.528
	S_{24}	1.0227	1.0100	12.75	10.62	3.33	3.69	0.67	0.46	0.134	0.127	0.665	0.320	0.036	0.043	4.553	3.021
Y_3	S_{16}	1.0086	1.0072	7.75	7.37	3.28	3.76	0.30	0.29	0.144	0.130	0.714	0.305	0.018	0.029	1.114	1.331
	S_{24}	1.0339	1.0059	12.25	10.50	3.32	3.69	0.75	0.44	0.144	0.130	0.672	0.322	0.036	0.046	4.643	2.763
CD at 5% level	S_{16}	0.0088		0.5366		0.0950		0.0560		0.0087		0.0444		0.0050		0.1026	
	S_{24}	0.0043		0.5229		0.0370		0.0446		0.0106		0.0204		—		0.2451	

Strains	Sugar levels	Tannin %		Phosphorus mg %		Alcohol % v/v		SO_2 ppm		Esters ppm		Bacteria per ml		Fungi per ml		Organoleptic tests (total 20)	
		M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD
Y_1	S_{16}	0.0720	0.0567	12.90	10.70	6.50	6.77	123.57	118.80	17.82	23.64	73	97	42	49	11.25	13.10
	S_{24}	0.0722	0.0590	12.62	10.50	8.35	10.35	118.70	118.50	24.49	45.87	52	44	39	36	11.70	13.90
Y_2	S_{16}	0.0752	0.0557	12.90	12.60	6.47	6.50	114.35	119.00	16.96	22.20	75	100	44	49	10.87	12.60
	S_{24}	0.0753	0.0587	13.25	11.07	8.17	9.70	113.40	116.00	25.65	46.74	51	45	43	39	11.70	13.60
Y_3	S_{16}	0.0730	0.0520	13.40	11.00	6.20	6.37	117.05	111.75	16.95	23.98	74	98	48	55	11.00	12.60
	S_{24}	0.0773	0.0570	13.50	11.80	6.00	9.67	120.70	113.30	27.05	50.74	61	46	42	35	12.12	13.50
CD at 5% level	S_{16}	—		1.0581		0.2440		10.61		3.020		10.69		8.5		0.74	
	S_{24}	0.0050		3.0593		0.5931		8.08		4.290		7.7		6.1		0.79	

TABLE 3. *Effect on physico-chemical characteristics of ciders due to nitrogen treatments (mean values)*

Nitrogen level	Sugar levels	Specific gravity		TSS (final) %		pH		Ash %		Pectin %		% Total acidity		% Volatile acidity		Total sugars %	
		M	RD	M	RD	M	RD	M	RD	£0	RD	M	RD	M	RD	M	RD
N_0	S_{16}	1.0292	1.0253	10.00	9.83	3.25	3.71	0.606	0.476	0.143	0.129	0.678	0.314	0.017	0.024	3.820	3.438
	S_{24}	1.0416	1.0342	15.00	14.83	3.38	3.78	0.800	0.600	0.139	0.129	0.675	0.338	0.002	0.036	6.699	6.648
N_1	S_{16}	1.0003	1.0012	6.00	5.83	3.28	3.84	0.287	0.187	0.140	0.129	0.695	0.295	0.019	0.302	0.228	0.770
	S_{24}	1.0246	1.0012	10.50	8.50	3.29	3.65	0.720	0.390	0.140	0.129	0.678	0.311	0.040	0.049	3.983	1.671
N_2	S_{16}	1.0013	1.0003	6.91	6.33	3.33	3.78	0.300	0.220	0.147	0.128	0.697	0.307	0.184	0.031	0.225	0.721
	S_{24}	1.0322	0.9973	11.50	8.50	3.30	3.68	0.670	0.380	0.142	0.131	0.667	0.315	0.044	0.048	3.703	1.477
N_3	S_{16}	1.0039	0.9996	7.00	7.00	3.27	3.76	0.253	0.233	0.142	0.131	0.708	0.281	0.017	0.028	0.229	0.790
	S_{24}	1.0202	1.0004	12.75	9.30	3.37	3.67	0.700	0.410	0.142	0.129	0.660	0.313	0.043	0.047	3.806	1.565
CD at 5 % level	S_{16}	0.0065		0.4649		0.0828		0.0490		0.0083		0.0383		0.0040		0.0884	
	S_{24}	0.0037		0.4490		0.0348		0.0387		0.0087		0.0176		—		0.2122	

Nitrogen level	Sugar levels	Tannin %		Phosphorus mg %		Alcohol % v/v		SO_2 ppm		Esters ppm		Bacteria per ml		Fungi per ml		Organoleptic tests (total 20)	
		M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD
N_0	S_{16}	0.0733	0.0513	13.16	12.16	4.00	4.20	122.60	101.40	8.52	9.95	75	92	42	48	9.16	10.33
	S_{24}	0.0731	0.0607	12.83	11.83	6.23	6.26	119.30	120.40	17.40	22.05	55	70	49	48	10.50	10.80
N_1	S_{16}	0.0740	0.0573	12.50	11.16	7.33	7.46	117.20	111.70	21.04	28.16	86	106	46	53	12.00	13.33
	S_{24}	0.0743	0.0563	12.33	10.50	9.86	11.36	117.70	113.90	28.24	56.78	51	34	36	31	12.50	14.60
N_2	S_{16}	0.0723	0.0553	13.16	11.23	7.40	7.56	112.90	117.80	19.06	26.69	77	106	35	54	12.00	13.50
	S_{24}	0.0760	0.0600	12.33	11.17	9.26	1.90	115.20	114.60	27.63	56.56	48	36	34	33	12.30	15.30
N_3	S_{16}	0.0740	0.0553	13.33	11.33	6.83	6.90	120.50	115.00	20.34	28.16	60	89	46	49	11.00	14.00
	S_{24}	0.0760	0.0566	13.66	10.86	8.33	10.43	118.20	114.70	29.73	55.40	64	38	47	35	12.00	13.80
CD at 5% level	S_{16}	—		0.9162		0.2113		9.1700		2.6100		9.2600		7.36		0.64	
	S_{24}	0.0043		2.6496		0.5135		6.9900		3.7200		6.7000		5.30		0.68	

TABLE 4. *Effect on physico-chemical characteristics of ciders due to varieties* (mean values)

Sugar levels	Specific gravity		TSS %		pH		Ash %		Pectin %		% Total acidity		% Volatile acidity		Total Sugar %	
	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD
S_{16}	1.0087	1.0066	7.48	7.25	3.28	3.77	0.36	0.28	0.143	0.129	0.649	0.298	0.017	0.028	1.125	1.429
CD at 5% level	0.0357		0.6578		0.1172		0.0684		0.0109		0.0544		0.0061		0.1248	
S_{24}	1.0297	1.0083	12.43	11.20	3.33	3.70	0.72	0.44	0.141	0.129	0.669	N.20	0.037	0.045	4.549	2.840
CD at 5% level	0.0052		0.6340		0.0479		0.0544		0.0124		0.0239		—		0.2996	

Sugar levels	Tannins %		Phosphorus mg %		Alcohol % v/v		SO_2 ppm		Esters ppm		Bacteria per ml		Fungi per ml		Organoleptic tests (total 20)	
	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD	M	RD
S_{16}	0.0734	0.0548	13.04	11.47	6.40	6.54	118.15	116.51	17.24	23.24	74	98	45	51	11.04	12.80
CD at 5% level	—		1.7615		0.2987		12.98		3.70		13		10		0.90	
S_{24}	0.0748	0.0584	13.00	11.09	8.17	9.90	117.6	115.9	25.63	47.78	54	45	41	37	11.80	13.60
CD at 5% level	0.0174		3.7428		1.0385		9.89		5.27		9.5		7.5		1.02	

ageing to mellow the harshness and to improve the quality of cider.

Volatile acidity: The volatile acid content of *Maharaji* cider (0.017-0.046 per cent) was significantly less than *Red Delicious* cider (0.023-0.050 per cent) which may be attributed to different cultural behaviour of the yeast cultures and the variety differences. Amerine *et al.* (1967) has also reported less than 0.05 per cent volatile acidity in sound and new wines.

Total sugars: The sugar content of *Maharaji* and *Red Delicious* ciders at S_{16} varied from 0.208-3.909 per cent and 0.640-3.453 per cent and at S_{24} from 3.146-6.812 per cent and 1.374-6.762 per cent, respectively. The control samples yielded highest amount of residual sugar. From the mean values, it is evident that all the yeast strains reacted differently in their behaviour to utilize sugar at all levels of nitrogen used, and between the apple varieties but not within the variety.

It was noticed that nitrogen deficient apple juice produced stuck ciders even with highly potent yeast cultures and the application of 0.1 per cent nitrogen at 16 per cent sugar level and 0.15 per cent nitrogen at 24 per cent sugar level proved useful for fermentation. It needs further exploration as to why yeast cultures failed to utilize sugar in *Maharaji* variety juice, to the extent they used in *Red Delicious* juice at 24 per cent sugar level in the samples supplemented with nitrogen.

Tannins: The tannin content was more in *Maharaji* (0.070-0.078 per cent) than *Red Delicious* (0.05-0.06 per cent) but these values were in accordance with those reported by Nagi and Manjrekar (1976).

Phosphorus: Maharaji and *Red Delicious* ciders did not show any significant variation in their phosphorus content. Phosphorus thus does not seem to contribute significantly in the fermentation of sweet ciders as was also concluded in a similar study by Jacquin and Tavernier (1951).

Alcohol: Within *Maharaji* variety, the strains Y_1 and Y_2 produced significantly higher amount of alcohol than Y_3, whereas in *Red Delicious* Y_1 produced significantly higher alcohol than Y_2 and Y_3. The nitrogen treated samples gave significantly higher amount of alcohol than untreated samples. The treatments N_1 and N_2 did not show variation but gave higher amount of alcohol than produced at N_3 nitrogen treatment. The yeast strain Y_1 at N_2 level of nitrogen in both the varieties produced the highest amount of alcohol followed by Y_2 and Y_3 at the same nitrogen level. The alcohol (ethyl) yield varied from 4-8 per cent v/v. The values are in close agreement with those of Bowan (1959) and Nagi and Manjrekar (1976).

In cider from S_{24}, it was observed that the alcohol production varied significantly between two apple varieties due to the cultural effect at different N levels. It was observed that Y_1 at N_2 level was superior to Y_2 and Y_3 at the same N_2 treatment. The alcohol content was raised from 6.1-11.8 v/v which is within limit of 12 per cent as per new definition of cider. It can be inferred from the present study that a sugar nitrogen balance at 16:0.1 per cent (correspondingly 24:0.15 per cent) was most suitable in the fermentable juice.

SO_2: The total sulphur dioxide content varied from 102-128 and 102.0-125.6 ppm in *Maharaji* and *Red Delicious* cider, respectively. The maximum legal range of SO_2 in English ciders is 200 ppm (Beech, 1972). The SO_2 content determined in the present investigation did not yield any off flavour rather it preserved the cider satisfactorily.

Esters: The data indicated that ester formation (ethyl acetate) in cider varied significantly between apple varieties due to yeast cultures and the nitrogen treatment.

The ester content in cider varied from 7.90 to 29.48 and 9.68 to 61.00 ppm in *Maharaji* and *Red Delicious*, which seems to be moderately well balanced and in accordance with the legal limits.

Microflora: The bacterial counts were significantly higher in *Red Delicious* than in *Maharaji* ciders at S_{16} and not at S_{24} level of sugar. The general range varied from 39-87 and 31-111 per ml in *Maharaji* and *Red Delicious* respectively, which was significantly lower than reported by Nagi and Manjrekar (1976). The low bacterial counts might suggest more hygienic method of cider making in the present study.

Organoleptic evaluation: From the score means, it is evident that cider prepared from apple juice containing 16 per cent and 24 per cent sugar varied significantly between the apple varieties due to culture behaviour of the yeast and nitrogen treatment. In all the cases, cider prepared from *Red Delicious* apple was more acceptable as it scored higher points (13-16) because of more palatable total acidity, suitable pH, high alcohol and aroma value.

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NUTRITIONAL QUALITY OF TROPICAL PADDY STRAW MUSHROOM (*VOLVARIELLA VOLVACEA*)

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Introduction

Since early times, mushrooms have been considered as an exotic delicacy, mainly because of their good culinary properties. Today, mushrooms are recognised as a novel source of vegetable protein and vitamins which can be commercially exploited.[1] During 1972-73, India exported 24,699 kg of mushrooms worth over Rs. 58 lakhs.[1a] Earlier reports[1-4] on nutritional quality of mushroom refer mainly to *Agaricus* species or other European varieties and very rarely to tropical varieties. The present work was undertaken to evaluate the nutritional quality of paddy straw mushroom (*Volvariella volvacea*) commercially grown in Kerala on which no published information is available in India. Zakia Bano *et al.*[5] have reported the essential amino acid composition of another variety of paddy straw mushroom (*Volvariella diplacea*). Overseas, there is only one reference[6] on the proximate composition of *V. volvacea* from Philippines, which is however not comprehensive. Much of the earlier work[7-9] done in India refers to cultivation aspects. Besides, there is little published information on the nature and quality of protein in this mushroom. The present report covers its chemical composition, fractionation of nitrogen, protein nitrogen and non-protein nitrogen as well as alpha-amino nitrogen present therein.

Materials and Methods

Raw materials: The work was initiated as an ad-hoc research programme on nutritive value, dehydration and canning of paddy straw mushroom (*Volvariella volvacea*) at the request of Messrs Mycelium Pvt. Ltd., Thrikkakara Industrial Estate, Kalamassery, Cochin. Freshly harvested paddy straw mushroom (*Volvariella volvacea*) grown by the company in their farm and supplied to the Station within 3-4 hours of harvest were used in this study.

Method of analysis: Moisture in fresh and dehydrated mushroom was determined by the method reported earlier.[10] Proximate analysis was carried out by AOAC methods,[11] sugars were determined by the rapid colorimetric method of Ting[12] and total nitrogen by the micro-kjeldahl method, while non-protein nitrogen (NPN) was estimated by the trichloroacetic acid method.[13] The alpha-amino nitrogen in the NPN fraction was estimated by Sorenson's formol titration method.[14] Fractionation of nitrogen was conducted by the solubility method.[15]

Results and Discussion

The results (Table 1) indicate that *V. volvacea* is a good source of protein (37-38 per cent on dry weight basis) and certain other nutrients. The raw mushroom contained 88-92 per cent moisture whereas the veil (sheath) part contained upto 95 per cent moisture. There was no significant difference in the chemical composition of grey and white mushroom while the veil part contained less nutrients notably protein. The crude protein content of dried mushrooms was 3-4 times higher than that

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TABLE 1. *Physico-chemical composition of paddy straw mushroom (Volvariella volvacea)*

Physico-chemical characteristics	Grey Mushroom	White Mushroom	Veil or Sheath of Mushroom
1. Moisture %	88.42	92.41	94.60
2. Fther extract %	3.20	2.80	6.91
3. Protein (crude) %	37.43	38.75	27.34
4. Crude fibre %	17.00	15.33	29.10
5. Glucose %	0.36	0.36	0.46
6. Fructose %	0.22	0.22	0.16
7. Sucrose %	0.10	0.09	0.03
8. Total sugars %	0.68	0.66	0.65
9. Other carbohydrates (Acid hydrolysable)	26.28	28.15	18.70
10. Total ash %	14.07	13.10	11.00
11. Ash insoluble in HCl %	0.46	0.43	0.1
12. Calcium mg/100 g	92.00	82.00	48.00
13. Phosphorus mg/100 g	873.00	979.00	227.00
14. Iron mg/100 g	18.00	14.00	4.40
15. Ascorbic acid mg/100 g	4.70	4.70	3.20

N.B.: All the results are expressed on moisture-free basis.

reported in the Philippine species.[6] On the other hand, the amount of carbohydrates was less than the earlier reported value.[6] Sugars were present upto only 0.66 to 0.68 per cent, most of which were reducing sugars. The ash content was relatively high, which indicates the presence of considerable quantities of minerals. It had only 4 to 5 mg of vit. C per 100 g as compared to 8.6 mg in *Agaricus bisporus*[16] which also contains B_1, 0.12 mg; B_2, 0.52 mg; niacin, 5.85 mg and pantothenic acid, 2.38 mg/100 g and vitamins A, D, and E were nil.[16] These variations in chemical composition or nutritional quality of mushrooms are likely to be due to variations in soil or substrate and agroclimatic conditions, etc.

The results of fractionation of nitrogen (Table 2) show that globulin accounted for a major fraction (19 per cent) of total nitrogen followed by glutelin (9.0 per cent), albumin (7.1 per cent) and prolamine (3.8 per cent). The corresponding figures for blanched mushroom were slightly higher even though there was a loss in total nitrogen due to blanching. This may be attributed to the loss of some water soluble nitrogenous substances during blanching. *Agaricus* species, which are reported to have the highest protein content of 62.2 per cent —DWB (Table 3) among the cultivated mushrooms, have a digestibility of 88.5 per cent which is relatively high as compared with other foods except meat[1] (98.9 per cent). In the present work, the result of non-protein nitrogen analysis (Table 2) revealed that 56 per cent of the total nitrogen in mushroom is in the form of protein nitrogen. Fresh mushrooms therefore contained 1.86

TABLE 2. *Fractionation of nitrogen in white paddy straw mushroom (Volvariella volvacea)*

Nitrogen fractions	Control (No treatment)		Steam-blanched for 3 min	
	N %	% of total N	N %	% of total N
1. Total nitrogen %	5.30	...	4.55	...
2. *Albumin* (Water soluble) %	0.38	7.1	0.35	7.7
3. *Globulin* (3% salt soluble) %	1.00	19.1	0.97	21.3
4. *Prolamin* (Alcohol soluble) %	0.20	3.8	0.18	3.9
5. *Glutelins* (alkali soluble) %	0.47	9.0	0.42	9.2
6. Non-protein nitrogen %	2.32	44.0	2.10	47.2
7. Residue %	0.93	17.1	0.23	10.7

N.B.: All results are on moisture-free basis.

per cent crude protein. This is in fair agreement with reported values for other types of mushrooms.[1, 5, 6, 16] (Table 3). Non-protein nitrogen was however, considerable (44 per cent), of which 23.7 per cent accounted for alpha-amino nitrogen. The loss of total nitrogen due to blanching was about 14.1 per cent, of non-protein nitrogen 9.5 per cent and of alpha-amino nitrogen 45.4 per cent.

To conclude, paddy straw mushroom provides quite a delicious vegetarian diet rich in protein, minerals and vitamins of B group. Among the fresh vegetables, mushroom provides the highest protein content.

Acknowledgements

This work was undertaken at the request of M/s Mycelium Pvt. Ltd., Thrikkakara

TABLE 3. *Comparative proximate composition of different species of edible mushrooms*

Physico-chemical characteristics	*VOLVARIELLA* SPECIES[1,5,6]					
	V. volvacea				*V. diplacea*[5]	
	Our work (India)		Philippine work[6]		Indian work[6]	
	FWB	DWB	FWB	DWB	FWB	DWB
Moisture %	92.41	...	89.42	...	90.40	...
Fat/Ether extract %	0.21	2.80	0.45	4.24	0.25	2.60
Crude protein %	2.94	38.75	1.04	9.81	3.90	40.62
Carbohydrates %	2.19	28.15	7.31	69.00	...	...
Crude fibre %	1.15	15.33	0.96	9.05	1.67	17.40
Ash %	0.99	13.10	0.82	7.75	1.10	11.45

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AGARICUS SPECIES[1,16,17]

Agaricus compestris		*Agaricu spp.* (Zega)		*Agaricus spp.* (stepp)	
U.S.A.		Pileus	Stipe	U.S.A.	
FWB	DWB	FWB	DWB	FWB	DWB
88.10	...	...	...	90.00	...
0.40	3.36	2.55	1.31	0.20	2.00
3.50	29.41	62.15	48.14	5.00	50.00
6.80	57.00	...	...	3.00	30.00
...	...	7.38	7.25	...	...
1.20	10.08	7.09	6.72	...	...

STANDARDIZATION OF MUSHROOM (*PLEUROTUS* SP.) PICKLE IN OIL

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Introduction

Preservation of raw fruits and vegetables by pickle making is in vogue from ancient times. Several recipes of pickle preparation in oil or vinegar are in practice in different parts of the country suitable to their taste.[1] Preservation of mushrooms by canning[2] and dehydration[3] is in practice for quite sometime, but pickle preservation has been a recent attempt. Unlike other fruits and vegetables, mushrooms have a high rate of metabolic activity and are highly perishable, hence they require immediate treatment for preservation. *Pleurotus flabellatus*[4] and P. eous[5] have been cultivated successfully at this Institute. They are found to be quite suitable for dehydration and pickle preparation.

A recipe has been standardized and described in this communication to suit Indian palate.

Materials and Methods

Preparation of raw material

Pleurotus mushrooms are petal like or thalloid in shape so they are chopped into about 0.5 to 1 cm broad shreds with stainless steel knife, washed in clean water twice and squeezed gently to remove excess water lodged in between the gills.

Recipe

1.	Mushroom (chopped)	1 kg
2.	Cumin seeds	12 g
3.	Fenugreek seeds	12 g
4.	Coriander seeds	12 g
5.	Turmeric powder	7 g
6.	Mustard seeds (ground)	10 g
7.	Green chillies (med. size)	12 nos.
8.	Vinegar (commercial)	350 ml
9.	Salt (powdered)	50 g
10.	Sesame oil (approx.)	500 ml

Procedure

The prepared mushroom was cooked in 150 ml sesame oil with salt sprinkled over it in a covered stainless steel pan on simmering flame for 20-30 min. and kept aside. Cumin, fenugreek and coriander seeds were roasted in an open pan, powdered and mixed with ground mustard seeds and turmeric powder, now called *spice mixture*. Green chillies were slitted longitudinally and lightly fried in about 100 ml oil, then *spice mixture* was added and mixed well in oil. Then the cooked mushroom was added and the whole mass was thoroughly mixed. Finally vinegar was added, heated to boiling and filled hot in bottles after removing from the flame. Later 2-3 tablespoons of heated and cooled oil was poured in each bottle to cover the pickle completely and caps were screwed on the bottles.

Wide mouth glass bottles of 200 ml capacity with bakclite screw cap were used. The bottles were stored at room temperature (22-34°C) for over six months. About 210-220 g of pickle was filled in each bottle weighing 180 g with cap.

Discussion and conclusion

Pickle stored for more than six months was analysed according to the specifications laid down under the Fruit Products Order (FPO) of Govt. of India. The pickle was found to contain 0.9 per cent acidity as acetic acid and taste and smell of the solid pieces of the product was reported as 'salty, slightly hot, acidic and spicy taste with mushroom flavour'. There was no rancid or off flavour noticed in the product and it conformed to the specifications laid down in FPO for pickle in oil.

Mushroom pickle was prepared in refined groundnut oil and mustard oil also in the same manner. The groundnut oil pickle was found to impart a little off flavour after 2 months of storage at room temperature and the mustard oil pickle offered a product having typical strong mustard flavour which masked the mushroom flavour completely. Preliminary studies showed that *Pleurotus* mushroom can be used for the preparation of sweet chutney also.

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DYEING OF KARONDAS FOR MAKING THEIR PRESERVE

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Introduction

Karonda (*Carissa carandus*), a small berry-like fruit, is grown extensively in Northern India on hedge plants. The berries have an oblong shape. When ripe in summer these sometime develop a pink to light red pigment patch on the white body. The fruit is highly acidic in taste and is widely used in pickle making.[1] A fair portion of the fruit harvested is also utilized by preserve (murrabba) industry. The preserve is manufactured after artificially dyeing the fruits to give them a bright red tinge. Dyed karonda preserve, in the form of cut or whole fruits, is used for decorating cakes, pastries and a variety of confectionery preparations in place of crystallized *Maraschino* cherries as widely practised in certain western countries. The industry has often encountered difficulty in dyeing the fruits uniformly red. The fruits, after making their preserve, very often have uneven patches of different hues which do not given a good eye appeal. To overcome this difficulty the problem was posed to us by the industry to find an appropriate processing technique to enable the fruits to pick-up uniform colour which should be retained during preserve making. The present study was undertaken for this purpose.

Experimental

Raw material: Both fresh as well as salted fruits were obtained from one of the preserve making unit in Kharibaoli (Delhi). The salted fruits were earlier kept in about 5.0 per cent salt solution in wooden vats for about two weeks. Salting is usually practised by the industry for storing fresh fruits during the season.

Chemical analysis: A random sample of 10-15 berries was taken, cut into small pieces and finally crushed to analyse for moisture, sugars (both reducing and total), acidity, pH etc. using standard AOAC methods.[2] Waxy matter in the fruit was determined by ether extraction (60°C B.P.) in a soxhlet apparatus. Sodium chloride in the salted sample was estimated using Volhards' method. Size measurements were made with vernier calliper.

Pretreatments of fruits: Before dyeing, the fresh fruits were punctured with sharp stainless steel needles fixed on a wooden handle. Later flat seeds from inside the punctured fruits were removed with a pointed needle after making a lengthy scission on the body with a sharp knife. The seeds, if not removed, not only developed a brownish tinge around them but also resulted in the off flavour of the preserve during storage.

Adjustment of pH: Twenty fresh fruits, after puncturing and deseeding, were separately boiled in about double their weight of 0.1 N (0.4 per cent) sodium hydroxide solution for 2 to 4½ minutes. At every half minute interval each lot of fruits was washed and kept in water for another one hour. The pH of each lot of fruits was measured, with a glass electrode, after draining and crushing them.

Dyeing of fruits: Two permissible red coal tar dyes, viz., (*i*) erythrosine and (*ii*) erythrosine + carmoisine (1:4) were used. Preliminary studies revealed that 0.05 per

cent concentration of these dyes gave the best colouration. Different lots of pH adjusted fruits were dipped in either of the dye solution, brought to boil and left overnight. During this period the fruits picked up the maximum colour.

Making of preserve: Coloured fruits were washed and boiled with equal proportion of previously prepared 35° Brix sugar syrup. The °Brix of syrup was raised daily by 10 per cent by adding more sugar till the syrup finally reached 70° Brix. Before finishing, the fruits in syrup were given a final boiling for 1-2 minutes after adding 0.1 per cent citric acid. With only a minor leaching of colour in the syrup, the fruits retained the initially picked up bright red colour. The fruit preserve, after draining, can be used as such or for preparing crystallized karonda after rolling them in crystal sugar. The syrup left after draining the fruits can be reused in making further lots.

Results and Discussion

The composition of the fresh and salted fruits as given in Table 1 reveals the highly acidic nature of these fruits. The fruits contain low proportions of reducing sugar and about 0.8 per cent ether extractives which consist of latex like waxy principles. Salting of fruits helps to leach out considerable proportion of acids besides removing the waxy principles. The patchy or non-uniform colouration of fruits obtained when fresh fruits were used, without alkali treatment, could perhaps be ascribed to the presence of the waxy constituents. Keeping the fruits in brine is thus helpful both to remove a part of acidity and waxy or fatty components from the fruits.

Colour pick-up by fruits seems to be related to pH (Table 2). Both erythrosine and 1:4 mixture of erythrosine+carmoisine in 0.05 per cent concentration could be used successfully depending upon the pink or red hue or tint required. The optimum range of pH for the best pick-up of dyes lay between 4.0 to 4.4. The key to success in the dyeing process lies in partially neutralizing the acidity in both salted and fresh fruits by boiling them with dilute alkali till the desired pH is obtained. The use of pH measuring paper strips should work quite handy for such adjustments.

Further, the slow raising of syrup concentration for making preserve from dyed fruits is more advantageous. It not only

TABLE 1. *Chemical composition of fresh and salted karondas*

Sl. No.	Estimation	Fresh fruits	Salted fruits
1.	Colour	(White with pink blush)	Light brown
2.	Size (d × 1 cm)	1.8-2.8 × 2.4-3.4	1.5-2.5 × 2.0-2.9
3.	Moisture (%)	85.60	87.97
4.	Total sugars as reducing (%)	0.81	0.55
5.	Acidity (%) W/W as citric acid	2.69	1.33
6.	pH	3.00	3.15
7.	Ether extract (%)	0.82	Nil
8.	Na Cl W/W(%)	Nil	2.15

TABLE 2. *Colour pick-up of the pretreated fresh fruits at different* pH

Boiling time in alkali solution (minutes)	pH	Dye concentration	
		Erythrosine 0.05%	Erythrosine 0.05% + Carmoisine 0.05% *
2.0	3.5	Light pink, uneven shade	Light red, uneven shade
2.5	3.8	-do-	-do-
3.0	4.0	Light pink, even shade	Dark red, even shade
3.5	4.4	Dark pink, even shade	-do-
4.0	4.7	Light pink, uneven shade	Light red, uneven shade
4.5	5.0	-do-	-do-

* Erythrosine and Carmoisine solutions were mixed in 1:4 ratio.

minimizes the leaching losses of the dye from the fruits but also helps to retain the size and shape of the fruits with a minimal shrivelling.

Summary

A method has been standardized for dyeing of karonda fruits for preserve making. Alkali treatment of these fruits is essential to raise their pH from 3.0 to about 4.0-4.4 to enable them to pick-up uniform colour. Both erythrosine and a mixture of erythrosine and carmoisine (1:4 ratio) in 0.05 per cent aqueous solution could be used depending upon the pink or red hue required.

Acknowledgements

The authors are grateful to M/s Harnarian Gokalchand for supplying raw and salted fruits. They are also grateful to Dr R. N. Singh, Head of the Division, for permission to undertake this *ad hoc* project.

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USE OF FOOD COLOURS IN INDIA

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Colour is an important aspect of a food's sensory appeal. Consumers associate certain colours with traditional foods and even in other foods, colour contributes substantially to consumer acceptability. Consequently, milk and non-milk sweets, general confectionery, fruit products, ice-cream, sherbets, baked goods, soft drinks etc. are being artificially coloured in India. Colours are often being illegally used in India in food ingredients such as *arhar dhal*, turmeric powder, chilli powder, tomato sauce, tea and country wine. Artificial colouring often becomes necessary in case of processed foods, canned and pulped fruits and vegetables which lose much of their attractive natural colour during processing or storage. A few artificial colours are being permitted by the Government for use in such foods.

Synthetic colours

A large number of synthetic colours such as the azo-dyes and triphenylmethane compounds containing sulphonic or carbocyclic groups were originally available for food colouration. But many of them were found to be toxic, causing cancer, or damaging vital organs like the liver, spleen and kidneys. The chief objection against the azo-dyes is that they can be carcinogenic in large enough doses. Metabolic action in the body results in the reduction of the azo group (N=N-) to amino (-HN_2) group. These reduction products are carcinogenic.

Water soluble colours like sunset yellow do not readily pass through the gut and are therefore removed with the normal body waste. Azo-dyes may be rendered water soluble by introduction of sulphonic acid (-SO_3H) group. Also, the amount of dyes used in foods is very low. Still, no dye is permitted until long (2-3 years) animal feeding experiments are conducted at comparatively high doses, to prove its safety. If any evidence comes up later from anywhere to the contrary, it is again tested and removed from the list, if found harmful.

Ensuring that the colour is water-soluble is one way of prevention of the accumulation of metabolic breakdown products which may cause cancer. Another method is formation of a lake with the dye and aluminium. Metabolic breakdown is prevented and since the lake is not soluble in water or fat, it is totally removed from the body. The present trend in the United States of America is towards the use of lakes rather than straight colours. These dispersed colours (lakes) have replaced water-soluble colours in sugar confectionery, particularly panned goods.

Yet another novel approach, currently under investigation in the United States and Europe, is preparation of water-soluble polymeric dyes.[1] These also belong to the class of non-absorbable food colourants, but are, at the moment, too expensive to receive serious consideration in India.

A list of artificial colours permitted in India for colouration of foodstuffs and non-permitted colours often found in eatables sold in shops are given in Table 1. The chemical structure of some of them are given in figure 1.

TABLE 1. *List of permitted and non-permitted colours*

Permitted colours		Non-permitted colours
1. Tartrazine 2. Sunset yellow	Yellow	1. Metanil yellow 2. Orange 11 3. Auramine 4. Rhodamine B 5. Blue VRS 6. Malachite Green 7. Red 6 B 8. Sudan II and III 9. Congo Red 10. Butter yellow 11. Methyl violet 12. Acid Magenta 13. Nigrosine 14. Onion yellow
3. Carmoisine 4. Ponceau 4 R 5. Amaranth 6. Erythrosine 7. Fast Red E	Red	
8. Indigo carmine 9. Brilliant Blue FCF	Blue	
10. Green S Fast 11. Green FCF	Green	

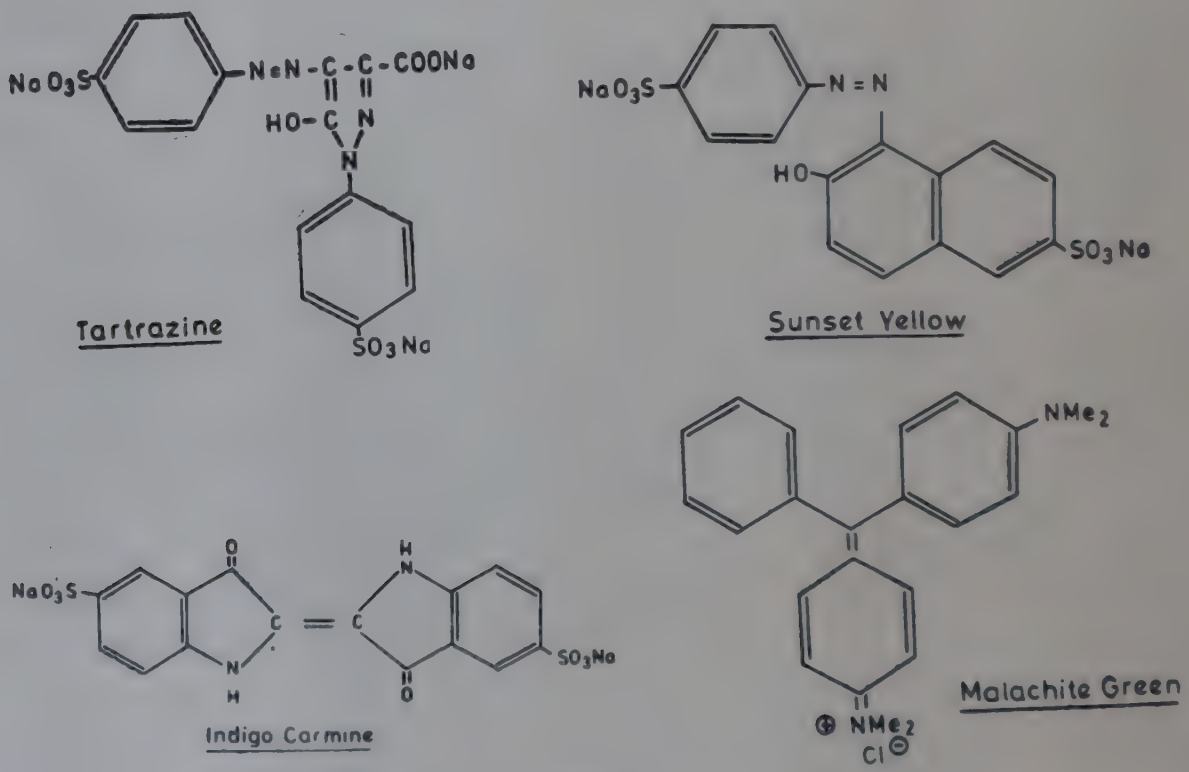

FIG. 1

In India, use of colours in foods is governed by the Prevention of Food Adulteration Rules, 1955, framed under the Prevention of Food Adulteration Act, 1954.[2] The approved coal tar dyes are permitted to be used in some 12 categories of foods. These colours must not be used in any other article of food. The list is given below:

1. Ice creams
2. Dairy products except dry milk, milk, dahi, butter, ghee, Chhana, Khoa, toned milk, cheese and baby foods
3. Biscuit, pastry, confectionery, savouries like *dalmoth*, *papar*, wafer and similar products and sweets
4. Fruit products

5. Non-alcoholic beverages except tea, cocoa (malted foods) and coffee.
6. Alcoholic beverages (till 31.12.77)
7. Custard powder
8. Jelly crystals
9. Soup powder
10. Processed or preserved vegetables
11. Flavouring agents
12. Ice candy.

Use of dyes in smoked fish, egg preparations, tomato products, chutneys and sauces has been banned in India since 1976.

The following natural colours or synthetically produced colours may be used in any article of food:

1. Beta carotene, Beta-apo-8^1-carotenal, methyl ester of Beta-apo-8^1-carotenic acid, ethyl ester of Beta-apo-8^1-carotenic acid and canthaxanthine.
2. Chlorophyll
3. Riboflavin
4. Caramel
5. Annatto
6. Rattanjot
7. Saffron
8. Curcumin

Inorganic colouring matters and pigments are not permitted in any article of food.

The maximum limit of any permitted coal tar dye or mixture of colours should be less than 0.2 gram per kilogram of the final food or beverage. Where used, the label of the package of food should clearly state that it is artificially coloured, except in the case of cheese, ice cream, icing sugar and gelatin desserts.

Normally, the minimum pure dye content in a permitted coal tar dye should be 85 per cent by weight. The rest can be fillers like salt, dextrose etc. Metallic contaminants like arsenic and lead should not exceed 1 and 10 parts per million respectively on dry basis. Under a new Government rule, the permitted dyes have to be sold only under Indian Standards Institution's Certification mark.

Many of the food dealers in India are not properly informed about the use of food colours. They do not know that only certain colours are permitted to be used, and that even the permitted colours can be used only in certain specified foods only. In a study[3] carried out by the Toxicology Research Centre, Lucknow, it was found that in Uttar Pradesh alone, 70 per cent of coloured eatables contained non-permitted colours like metanil yellow and malachite green. Milk based sweets from *Khoa* and *Channa* and other sweets like *laddoo*, *jehangir* and *jelebi* are usually coloured.

Standard methods are available for the extraction, separation and identification of synthetic colours in foods by techniques such as multiple solvent group separation and spot tests on dyed wool thread. In addition to qualitative detection of these colours, it is very necessary that the strictest control should be maintained on the type, purity and level of colours used in foods. Excessive use of even permitted colours can be harmful.

Of the 11 permitted colours, amaranth, sunset yellow and tartrazine are reported to be least harmful and kept in category A on the basis of toxicological classification by FAO/WHO Expert Committee on Food Additives.[6] These are considered acceptable and their permissible daily intakes have been worked out. The remaining colours cannot be used so freely.

But now amaranth has been banned in U.S.A., as it was found to cause cancer in rats.[7]

Natural Colours

Since many countries are thinking of banning use of coal tar dyes in foods, natural colours are now being considered

as alternatives. Some of the preparations are already available for commercial use abroad.

All natural pigments are not safe. However, those pigments present in edible materials such as fruits and vegetables are generally considered safe. But some people are insisting that the natural compounds should also be subjected to the same safety requirements as synthetic compounds. Thus, turmeric and annatto which are being extensively used for food colouration in India and abroad are now put on a suspect list by the WHO by giving them only a tentative and provisional status in the Codex Alimentarius. A few years time has been given for proving that they are harmless, before they can be listed as completely acceptable.

The choice of colours from natural sources is limited and their stability during processing is not very good, being subject to changes due to pH, heat, light, oxidation etc. Their tinctorial power is also low.

Natural colours available for food colouration can be divided into the following groups based on their chemical structures:

(1) Carotenoids, (2) Chlorophylls, (3) Anthocyanins, (4) Betalains and (5) Miscellaneous.

(1) *Carotenoids:* The carotenoids form a group consisting of about 300 natural compounds widely occurring in nature. They are made up of isoprene units and differ in the length of the middle chain and substitution at each end. Lycopene in tomato, bixin in annatto, beta-carotene in carrot and capsanthin and capsorubin in chillies are typical examples of naturally occurring carotenoids (Fig. 2).

Carotenoid preparations suitable for use in food products can be made in India from annatto, paprika, citrus peels, mango peels etc. Several natural and synthetic carotenoids are now commercially available in western countries. They impart yellow to orange colours to foods and are fairly stable to heat, pH changes and presence of vitamin C. Though they are chiefly fat soluble, they are also available in very finely dispers-

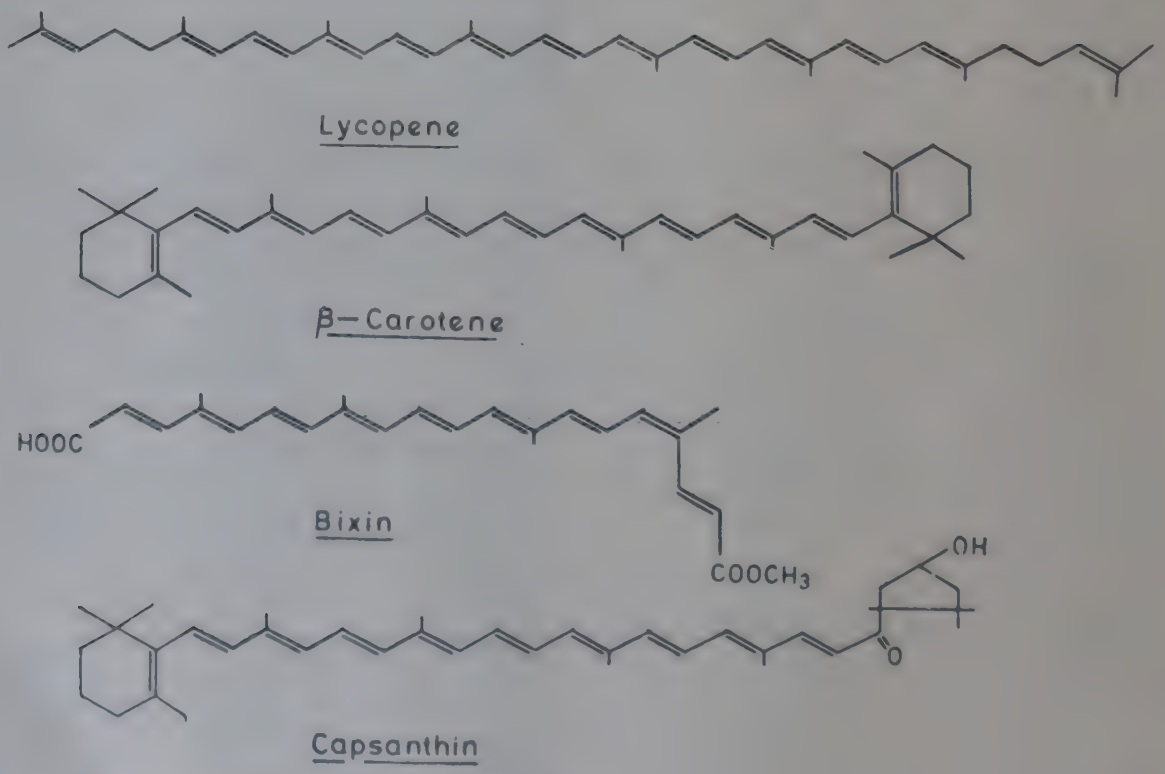

Fig. 2

ed form which can be used in aqueous foods. Liquid suspensions, gels and liquid emulsions are also sold. Crocin, the pigment of saffron, is a carotenoid glycoside and is water soluble, but is prohibitively expensive. It is possible to envisage use of some modified synthetic carotenoids with advantageous properties such as water-solubility.

(2) *Chlorophylls:* Chlorophylls (mainly chlorophyll a and b) are widely distributed in nature as the pigments of green leaves (Fig. 3). They consist of a porphyrin nucleus (made up of four pyrrole rings connected by four carbon atoms, completely conjugated), covalently bound to magnesium and a phytos group (a C-20 terpene alcohol).

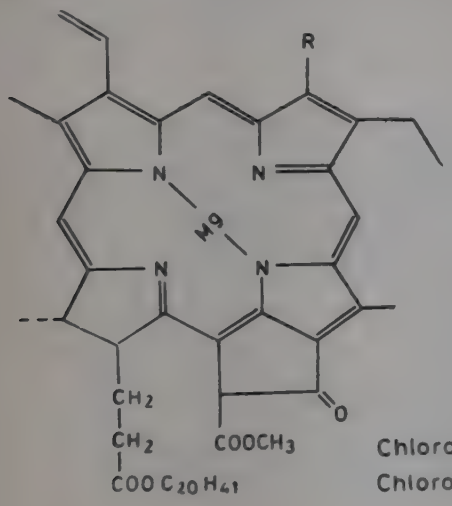

FIG. 3

Removal of phytol group (yielding the more stable chlorophyllide) has no effect on the colour, but removal of magnesium gives rise to dull brown pheophytin. Chlorophyll from which both magnesium and phytol are removed is also dull brown in colour and is called pheophorbide. Therefore much of the work on stabilisation of chlorophyll during food processing and storage is aimed at enzymatic removal of the phytol group (as the resultant chlorophyllide is considered more stable) and at stabilisation of the acid labile porphyrin-Mg bond (which is responsible for the green colour) by treatment with a base like calcium hydroxide. However, in spite of the enormous work done on this subject, no satisfactory method is available for stabilisation of the green colour in foods.

(3) *Anthocyanins:* Amongst the water-soluble pigments, the anthocyanins comprising a group of about 175 different compounds, are widespread in nature. They form the attractive red to blue colours in many fruits, vegetables, flowers and leaves. They are glycosides of what are called anthocyanidins and are biogenetically closely related to the larger group of flavonoids. The structures of the six most widely occurring anthocyanidins are given below (Fig. 4). The 3- and 3, 5-glycosides of these compounds are common.

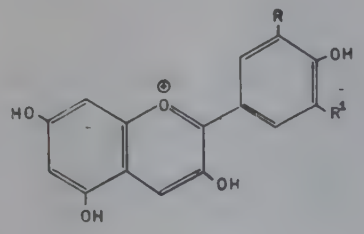

FIG. 4

Due to their ionic structure, they are water-soluble and are stable in acid medium. They are very susceptible to pH changes and undergo rapid degradation by hydrolysis, oxidation, ring-opening and polymerisation leading of phlobaphenes. They are rapidly decolourized in presence of ascorbic acid, amino acids, phenols etc. However, in view of their marked stability in acid pH, they are used for colouration of carbonated beverages, fruit drinks, jams, jellies etc. The grape pomace, left after extraction of the juice and the calyces of the *Hybiscus sabdariffa* flowers, as well as the kokum fruit (*Garcinia indica*) and red 'Gul-mohar' (*Poinciana regia*) flowers could be good sources for anthocyanin extraction. We have made some preliminary studies on these materials. Large-scale extraction and preparation of dispersed products are being tried.

Among other flavonoids of potential use as food colourants, mention must be made of the pigments of the safflower petals, namely the orange carthamin and the red carthamone. They are closely related in chemical structure and are interconvertible (Fig. 5). The technical feasibility of their extraction is under investigation.

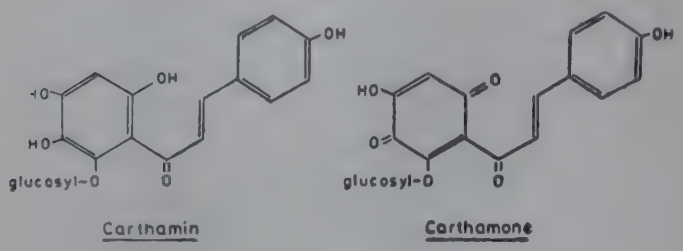

FIG. 5

(4) *Betalains:* The orange to red water-soluble pigments found in beets, cactus fruits, bougainvilia flowers etc. have the same basic structure and are called betalains. The structure of betanin, the major colouring matter of beet-root is given below (Fig. 6).

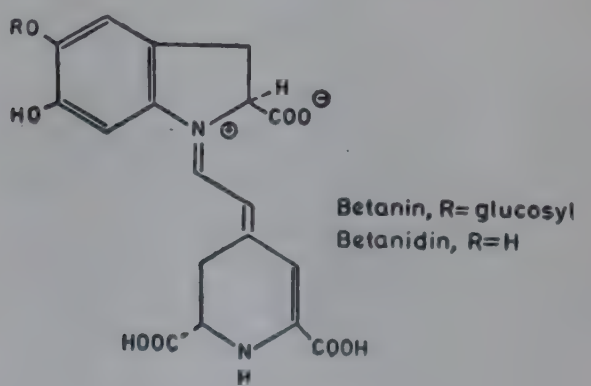

FIG. 6

The colour is attributed to the extended conjugation and the water-solubility to the Zwitter-ionic nature. But, unlike anthocyanins, they are less sensitive to changes in pH and can be used in desserts, beverages and ice-creams. Beet-root is grown in large quantities in India. Its aqueous concentrated extract can be spray-dried and used for food colouration.

(5) *Miscellaneous:* Apart from the major classes of compounds, there are several other naturally occurring colouring matters. Quinones (in lichens and fungi), xanthones (mangiferin in mangoes), curcuminoids (in turmeric), cochineal (in the female cochineal insect *Coccus cacti*) and anhydrobases (in the red sandalwood, barwood and camwood) are a few examples.

Caramel is used in soft drinks, bakery goods, vinegar, confectionery and alcoholic beverages for both colour and flavour. Caramel is a dark brown to black liquid or solid possessing the colour of burnt sugar and a pleasant bitter taste. It is prepared by the controlled heat treatment of food grade carbohydrates with or without addition of acids, alkali and salts. Caramels made from corn syrup and sugar, of guaranteed quality with respect to colour, mineral content, stability etc. are now being sold in India.

While safety, stability and solubility are important considerations for natural pigments which can be used in foods, their commercial feasibility depends on the cost of manufacture. This in turn depends on the cost of raw materials. The natural pigment preparations are bound to be more expensive than synthetic colours, since they

TABLE 2. *Possible natural sources of different colours*

Colour	Soluble in	Source
1. Orange to red	Water	Red and orange beets, *Sabdariffa* calyces, kokum rind, Gulmohar flower, grape skin, saffron, safflower petals.
	Fat	Capsicum, tomato, red palm oil, citrus and mango peels.
2. Orange to yellow	Fat	Annatto, turmeric, carrots, papaya.
3. Blue	Water	Blue grapes, jaman fruits.
4. Brown	Water	Caramel
5. Green	Fat	Edible green leaves.

have to be extracted from fruits, vegetables, flowers etc. The likely sources of different hues of colours are given in Table 2.

Expertise has to be built up for the commercial production of the natural pigments as the coal tar dyes are likely to be banned in India also soon. A beginning has now been made at the Central Food Technological Research Institute in this direction.

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STUDIES ON THE ENZYMATIC SACCHARIFICATION OF RICE BRAN POLYSACCHARIDES

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Abstract

Defatted rice bran was saccharified with the culture filtrate of cellulase producing organism Trichoderma viride QM6a. Heat treated and milled rice bran was found to be more susceptible to enzyme action and best result was obtained by heating bran to 80°C for 30 min. combined with grinding. It was found that the culture filtrate of TVQM6a also got a little (0.05 units/ml) amylolytic activity. Thus the reducing sugar (as glucose) obtained as high as 32.5 per cent as against the initial value of 2.37 per cent in fresh defatted bran was due to combined action of cellulase and amylase.

Introduction

Rice bran is a very important bye-product of rice milling industry and a potentially important source of carbohydrate, fat, protein, vitamins and minerals. But in spite of its high nutritional value it is still been used mainly as cattle and poultry feed. Annual production of rice bran in India is about 3.2 million tons and a considerable portion of it is being exported.[1] Several workers have determined the composition of rice bran and the composition varies widely with the type of rice, equipment used, method of milling and degree of polishing. An average composition is as:[2] moisture 10.64 per cent, protein 14.04 per cent, fat 18.20 per cent, crude fibre (cellulose) 11.4-12.3 per cent, ash 10.9 per cent, reducing sugar 2-3 per cent, carbohydrate (non-reducing) 28-30 per cent and vitamins specially of B-group.

Considerable amount of literature have been accumulated on the enzymatic saccharification of various forms of cellulosic materials. Katz and Reese[3] obtained a glucose syrup of 30 per cent concentration using heated and milled cellulose with concentrated *T. viride* cellulase. Continuous saccharification of cellulose pulp by employing culture filtrate obtained directly by submerged fermentation of *T. viride QM6a* has been reported by Ghose.[4] While the enzymatic saccharification of rice husk is available,[5] similar results with the rice bran is lacking.

Digestibility experiments of rice bran with respect to chicken[6] showed that the results for the rice bran were much similar to that of groundnut oil cake. Although the enzymatic saccharification of rice bran to increase the availability of digestible nutrients was never been tried, a report of

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the acid saccharification of bran, however, is available. Fukagawa *et al.*[7] studied the acid saccharification of bran by using both HCl and H_2SO_4 and showed that HCl is better saccharifying agent and maximum saccharification was obtained in 2-3 hr with 3 per cent HCl.

The present investigation was undertaken to establish the optimum condition of the conversion of polysaccharides, particularly cellulose present in rice bran to reducing sugars to make it available to the digestive systems of the consumers.

Materials and Methods

Medium composition: The culture filtrate of *Trichoderma viride QM6a* was used as the source of enzyme for saccharification. Separate media were employed for the growth of the organism and the production of the enzyme. The composition of the media was same as used by Mandels *et al.*[8]

Enzyme: Fermentation was carried out with 25 ml medium taken in 100 ml conical flask, sterilised at 15 psig for 15 min. and inoculated with 2 ml of inoculum and placed on laboratory rotary shaker at 28°C. Fermentation was continued for 6 days during which the production of enzyme attains maximum level. Inoculum was previously developed starting from the slant culture by transferring the spores of each slant aseptically with 5 ml of sterile distilled water to the 25 ml of the medium for the growth of the organism. Maximum growth was attained in 3 days of fermentation. The contents of the flask were centrifuged to separate the mycelium. The filtrate was used as the source of the enzyme. Enzyme produced in bulk is kept in cold room at 4°C for future use. The concentration of enzyme in the culture filtrate was 33 Cx unit/ml.

A cellulase unit (Cx) was defined as that quantity of enzyme which in 10 ml assay solution produces 0.1 mg of reducing sugars as glucose in 1 hr at 40°C. Assay solution contains 0.8 ml of 1 per cent CMC, 1 ml of enzyme solution in 0.2 ml 1 M Acetate buffer (pH 4.5). Finally reducing sugar produced was estimatied in 10 ml solution by Nelson-Somogy's method.

Substrate: Rice bran was defatted in Soxhlet apparatus using petroleum ether as solvent. Modification of the substrate was done by heat treatment in constant temperature oil bath and milling in the laboratory model pebble mill to increase the susceptibility of the substrate for enzyme action.

Enzyme activity: Cellulase activity was determined by estimating the reducing sugar according to the method of Nelson-Somogy.[8] Amylase activity of the culture filtrate was determined according to the method described by Gilbert *et al.*[10] One unit of amylase was defined as that amount of protein which will hydrolyse 10 mg of starch under specified conditions.[10]

Saccharification: Saccharification experiments were carried out in 25 ml conical flask containing 2 g of defatted rice bran suspended in distilled water (20 per cent suspension). A definite amount of enzyme solution was added, mixed well, pH adjusted to 5.0-5.2 and incubated at 45°C in laboratory shaker bath (120 r.p.m.) for a definite lengh of time. When saccharification is complete contents of each flask were dried at 60°C and the reducing sugar was extracted with 50 ml distilled water and was estimated according to Nelson-Somogy's method.[9]

Results and Discussion

Effect of enzyme concentration on saccharification: Various amounts of enzyme solution was added to bran in 20 per cent suspension and the saccharification was continued for three hours. The result was shown in the Fig. 1. It is evident from the results that the maximum amount of re-

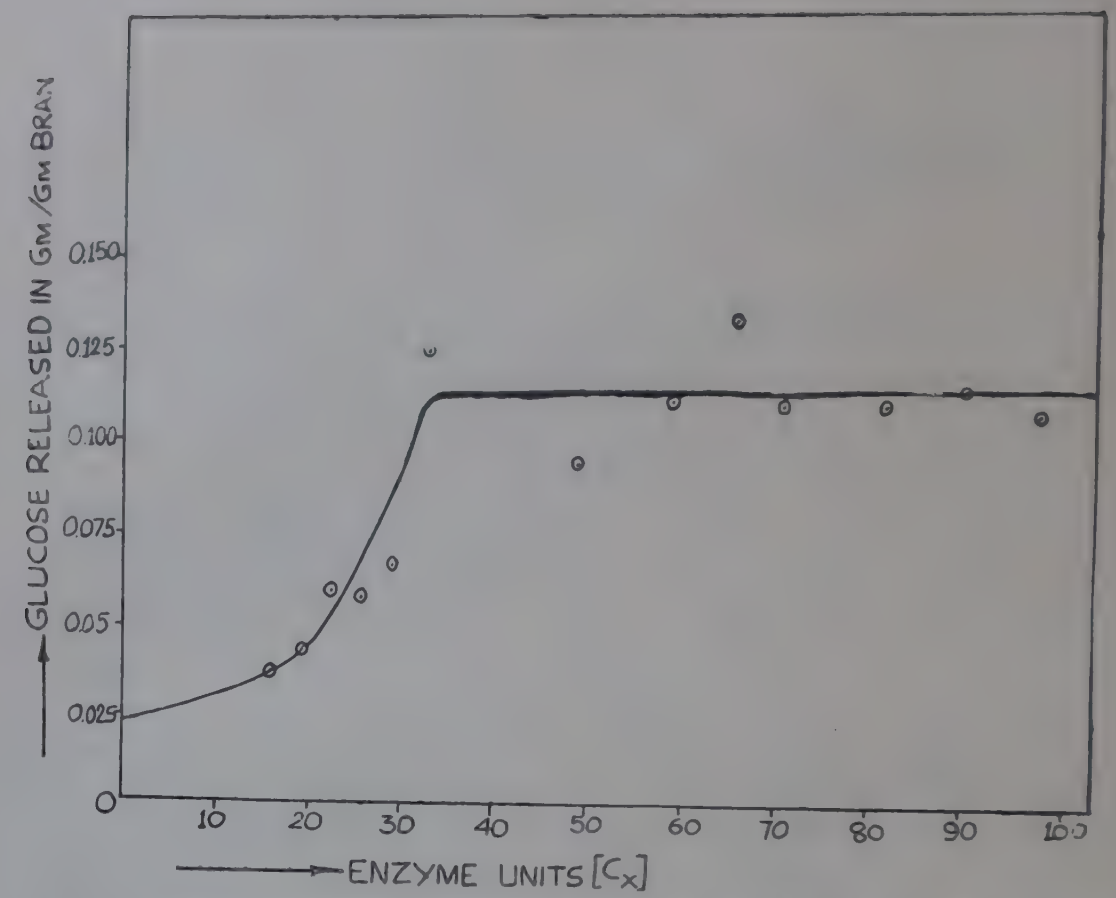

FIG. 1. Effect of enzyme concentration upon saccharification of bran. The starting point of the graph shows the initial amount of reducing sugar present in the substrate.

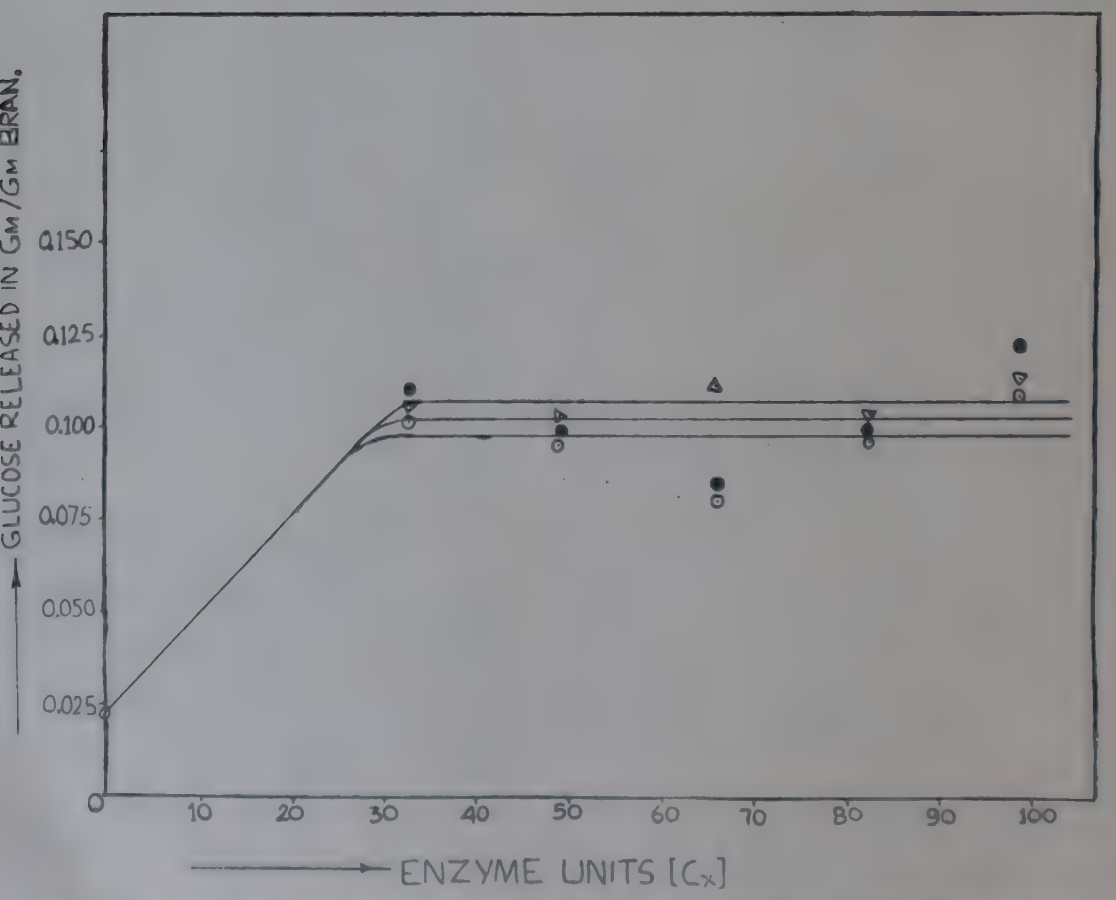

FIG. 2. Effect of enzyme upon various bran suspensions. The plot -●- for 25 per cent suspension. -△- for 20 per cent and -○- for 15 per cent.

ducing sugar is obtained when enzyme concentration was 33 Cx unit/g of the substrate. Initial amount of reducing sugar present in defatted rice bran was 23.7 mgg and after saccharification the value came to 125.75 mg/g.

Effect of substrate concentration upon saccharification: Experiments were carried out with three different suspension of bran in distilled water, viz., 15 per cent, 20 per cent and 25 per cent. Saccharification was continued for 2 hr. The result was shown in Fig. 2. It appeared from (Fig. 2) that the percentage conversion of polysaccharide is not dependent upon the substrate concentration under the conditions of the experiment. It is, therefore, quite reasonable to take higher suspension.

Effect of heat treatment of bran upon saccharification: Rice bran was heated for 45 min. at three different temperatures, viz., 50°, 70° and 80°C in constant temperature oil bath. The saccharification was continued for 4 hr. with the heat treated bran and with varying amount of enzyme. The result was shown in Fig. 3. Another experiment was carried out with rice bran heated at 80°C for various length of time and the saccharification was continued for 1 hr. The result was shown in Fig. 4. It seems from the above results that heat treatment slightly increased the production of reducing sugar and the best result was obtained by heating the bran at 80°C for 30 min. The heat treatment alone, however, do not have very remarkable effect.

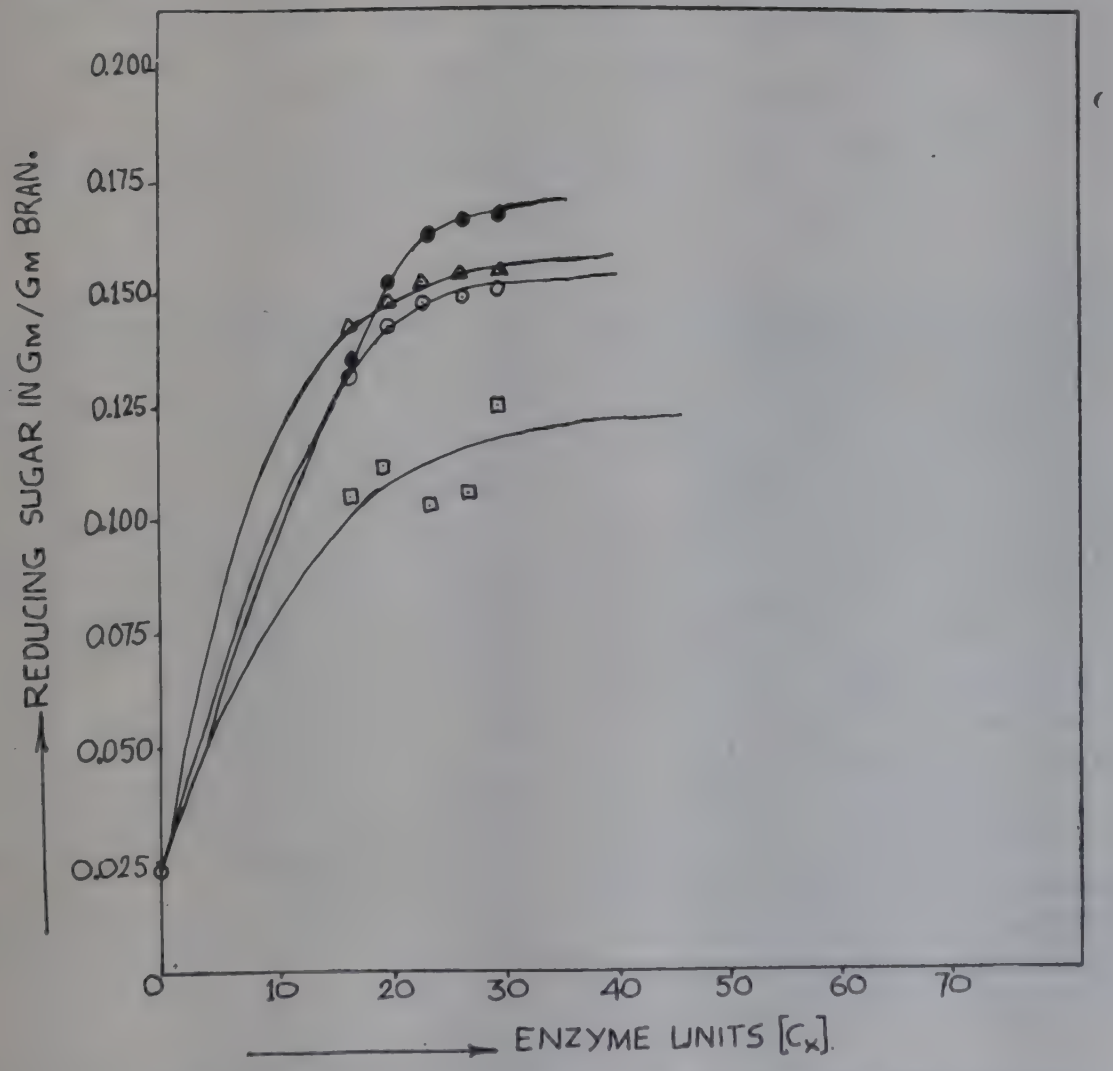

FIG. 3. Effect of heat treatment of the substrate -●- heated at 80°C for 3/4 hr, -△- heated at 70°C for 3/4 hr, -⊙- heated at 50°C for 3/4 hr, and -⊡- for control (without any treatment).

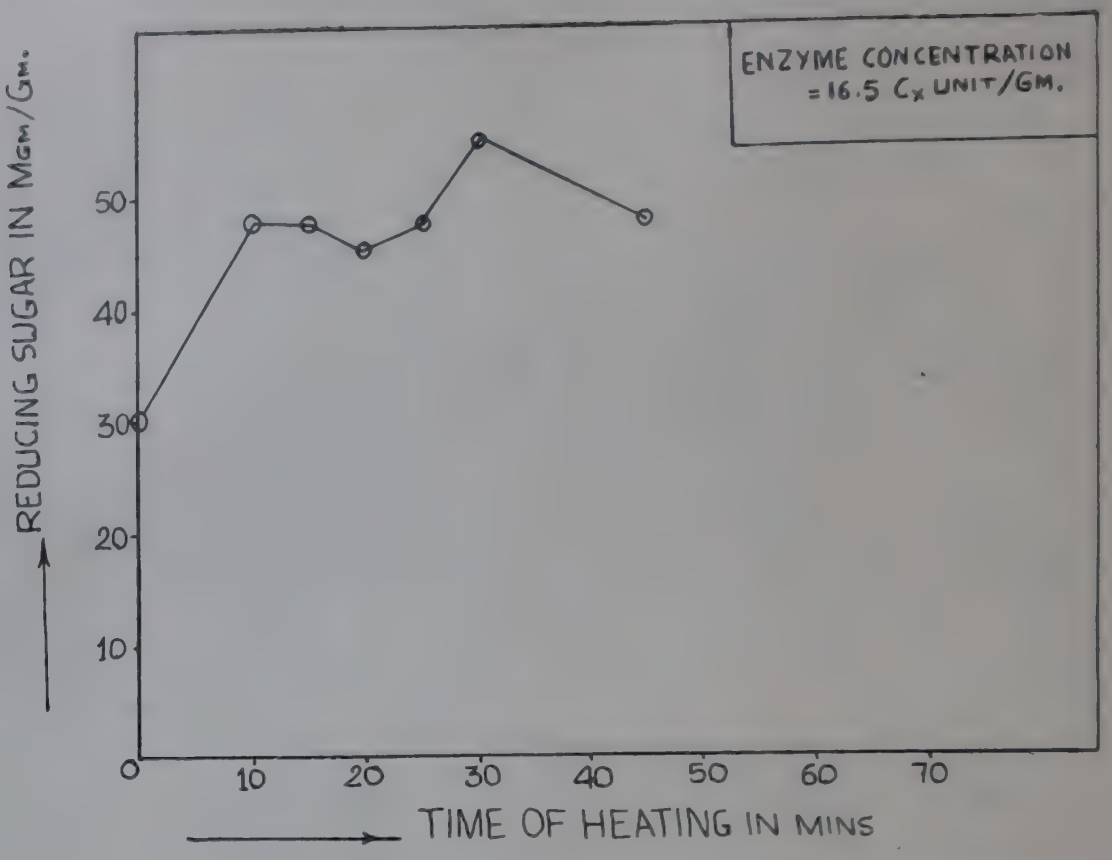

FIG. 4. Effect of time of heating of substrate at 80°C upon saccharification

Effect of both heating and milling of bran on saccharification: The bran heated to 80°C for 30 min. was milled in laboratory pebble mill and particle size of -200 mesh was taken for saccharification. The saccharification was continued for 2 hr with varying amount of enzyme and the result was shown in Fig. 5. It appeared that about two to three fold increase in the production of reducing sugars was obtained by heat treatment and milling of the bran. Although it is very difficult to explain the reasons for the increased susceptibility of the substrate for the enzyme action due to such treatment, still it might be reasonable to state that the above result might be due to combined action of oxidative heat treatment and milling resulting in higher surface area.

The rate of hydrolysis as it is found from the experimental results is a log-log function and assumed a general formula, $C=Kt^n$, where 'K' is the rate constant, 'n' is the slope of the profile, 't' is the enzyme substrate contact time and 'C' is the amount hydrolysed.

Because of the existence of the report[11] that the culture filtrate of *Trichoderma viride* has got some amylolytic activity, the amylase activity of the culture filtrate was determined and was found to be 0.05 unit/ml of the broth where cellulase activity was 33 Cx unit/ml. It is quite clear, therefore, that reducing sugars produced as high as 32.5 per cent in defatted bran (Fig. 3) was due to combined effect of amylase and cellulase action upon rice bran polysaccharides. Thus some starch is also broken down to reducing sugars by amylolytic action although conditions for saccharification reaction were kept optimum for the cellulolytic action.

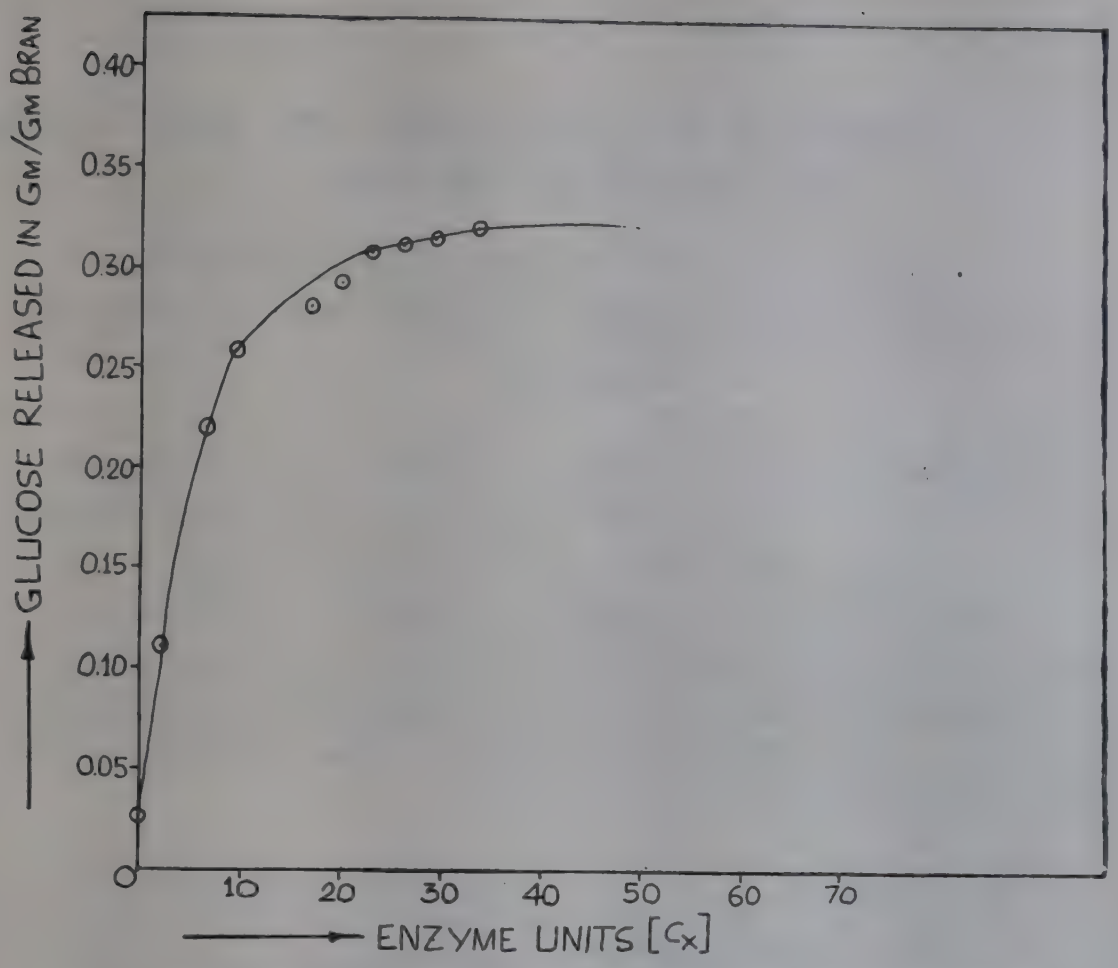

FIG. 5. Effect of both heat treatment and milling of bran upon saccharification

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EFFECT OF GROWTH REGULATORS ON THE STORAGE OF HIMROD GRAPES

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Abstract

The application of Alar 4000 ppm was the best for general appearance. The loss in weight was the minimum with Alar 3000 ppm, closely followed by Alar 4000 ppm. Alar 4000 ppm was the most effective to reduce berry shatter and berry rot. In reducing the berry rot Alar 4000 ppm was very closely followed by Alar 3000 ppm. The total soluble solids, acidity and reducing sugars decreased during the storage of grapes. Alar 4000 ppm was found to be effective to reduce loss in weight, berry shatter and berry rot during storage of Himrod grapes.

Introduction

Grapes being highly perishable cannot be kept for long after harvest. Therefore, there is a glut in the market and the price of the produce is much lowered. To get the remunerative prices, the surplus quantity of grapes must be stored to spread the marketing over a longer period. Alar and CCC have been found to increase the shelf-life of apples (Southwick *et al.*, 1966). Very few published reports are available about the role of growth regulators in improving storage life of grapes (Dhillon *et al.*, 1975). The present studies were, therefore, conducted to find the effect of preharvest application of CCC and Alar on the storage life of paper wrapped Himrod grapes in cold storage.

Material and Method

The 8-year-old vines of Himrod grapes planted 3×3 metres apart were used for these studies. Three concentrations, viz., 2000, 3000 and 4000 ppm of CCC and Alar were applied (Dip method for 60 sec.) at the second rapid growth stage of berry development (28 days before harvest) during 1976. Each treatment was replicated thrice. Mature bunches were harvested and the injured and rotten berries were removed and these bunches of all treatments including control were also treated with 0.2 per cent Captan before packing. The temperature of the cold storage varied from 30°F to 38°F with relative humidity ranging from 85 to 90 per cent. Three bunches, for each treatment, were packed in perforated paper bags. These bags were placed in the wooden crates and were stacked one above another in the cold storage chamber. Observations on the general appearance, loss in weight, berry shatter, berry rot, TSS, changes in acidity and reducing sugars were recorded after 20, 30 and 40 days of storage. Standard methods of AOAC (1970) were followed for chemical analysis.

Results and Discussion

General appearance: Alar 4000 ppm was the only treatment having rachis half green

TABLE 1. *Effect of CCC and Alar on the percentages of loss in weight, berry shatter, berry rot, TSS, acidity, and reducing sugar on the storage of Himrod grapes*

Treatment (ppm)	Loss in weight (%)				Berry shatter (%) Days after storage				Berry rot (%)			
	20	30	40	Mean	20	30	40	Mean	20	30	40	Mean
CCC-2000	10.45	11.51	12.87	11.61	5.22	17.33	25.59	16.05	5.45	7.91	15.52	9.63
CCC-3000	8.62	9.76	10.45	9.61	11.26	13.33	16.33	13.64	4.71	9.00	20.14	11.28
CCC-4000	7.54	9.13	10.23	8.96	4.09	13.17	18.36	11.87	4.43	13.00	22.02	13.15
Alar-2000	8.10	10.12	11.02	9.75	14.61	18.49	28.22	20.14	8.16	17.31	23.88	16.45
Alar-3000	4.89	6.74	8.96	6.86	12.14	19.79	27.43	19.78	3.53	4.53	7.43	5.16
Alar-4000	5.27	7.59	9.18	7.35	4.59	7.64	10.10	7.44	2.41	5.17	7.41	5.00
Control	6.96	10.71	13.19	10.29	4.95	10.26	11.82	9.01	2.79	6.90	10.99	6.89

	TSS (%)					Acidity (%)					Red Sugar (%)				
	0	20	30	40	Mean	0	20	30	40	Mean	0	20	30	40	Mean
CCC-2000	17.2	17.6	17.8	13.4	16.5	0.74	0.67	0.60	0.67	0.67	15.62	15.62	13.55	11.35	14.08
CCC-3000	17.8	17.4	17.9	13.6	16.5	0.67	0.74	0.80	1.14	0.84	15.24	16.66	15.62	11.35	14.72
CCC-4000	17.0	16.8	17.0	15.0	16.4	0.67	0.74	0.67	0.94	0.75	15.24	13.30	13.55	12.50	13.65
Alar-2000	17.4	17.4	18.0	14.8	16.9	0.67	0.67	0.60	1.01	0.76	15.24	15.62	15.62	11.35	14.45
Alar-3000	16.0	16.8	15.0	16.2	16.0	0.74	0.67	0.80	0.70	0.73	14.71	13.55	12.50	13.55	13.58
Alar-4000	17.0	16.0	17.8	15.0	16.5	0.54	0.74	0.57	0.84	0.67	12.50	15.62	15.62	13.15	14.22
Control	17.2	15.0	18.8	16.2	16.8	0.56	0.80	0.60	0.67	0.66	16.66	13.55	15.62	13.55	14.84

even after 40 days of storage. The pedicel in this case had completely dried. In control rachis and pedicel had completely dried even before 30 days of storage.

Loss in weight: All the treatments with Alar and CCC (Except CCC 2000 ppm) were effective in reducing the loss in weight (Table 1). Alar 3000 ppm gave the least loss in weight (6.86 per cent) closely followed by Alar 4000 ppm (7.35 per cent loss in weight) as compared with 10.29 per cent in the control. The perusal of the data clearly reveals the usefulness of Alar in reducing the loss in weight of grapes in the cold storage. As the storage period increased the loss in weight also increased which might be due to the respiration and transpiration. The increased loss in weight during the storage of grapes has also been reported by previous workers (Gupta, 1967; Malhi, 1968 and Dhillon *et al.*, 1975).

Berry shatter: The application of Alar 4000 ppm was found to be the only effective treatment to reduce berry shatter. The berry shatter under this treatment was 7.44 per cent as compared to 9.01 per cent in the control. All the other treatments in this study were not effective in controlling berry shatter of grapes in storage (Table 1). Reduction in berry shatter had been reported with pre- and post-harvest growth regulators (Gupta, 1967 and Rao, 1970) specifically used against berry shatter. Dhillon *et al.* (1975) concluded that the best time for spraying the growth regulators appeared to be the second rapid growth stage of berry development.

Berry rot: Alar 4000 ppm was found to be the most effective treatment to reduce berry rot (Table 1) closely followed by Alar 3000 ppm. The maximum reduction in the incidence of rot was obtained with Alar 4000 ppm (5.00 per cent) as compared with the control (6.89 per cent). All the remaining treatments (except Alar 4000 ppm and 3000 ppm) were found to be ineffective to reduce berry rot. In the present studies, the berry rot increased with the increase in the storage period and the incidence was highest after 40 days of storage. Gupta (1967); Malhi (1968) and Dhillon *et al.* (1975) had reported berry rot in grape cultivars, during storage, but the reduction in the present study due to Alar (4000 and 3000 ppm) application is appreciable.

Total soluble solids: Alar (2000 ppm) gave the higher TSS after 40 days of storage than control (Table 1). In all the remaining treatments, the TSS were lower than control after 40 days of storage. The TSS were reduced with the increase in storage period.

Acidity: The percentage of acidity was higher under all the treatments, after 40 days of storage, as compared with control. The acidity decreased during storage. Gupta (1967) and Malhi (1968) also reported a decrease in the acidity during the storage of grapes.

Reducing sugars: The reducing sugars decreased during storage of grapes. All the treatments gave the lower percentage of reducing sugars as compared to control. The present findings give the indication that the berry shatter during storage of grapes can be minimized with Alar 4000 ppm and berry rot can be reduced with Alar 3000 and 4000 ppm. Alar 4000 ppm can be used to reduce the loss in weight, and to keep the berry shatter and berry rot to the minimum.

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STUDIES ON THE PHYSICO-CHEMICAL COMPOSITION OF TWENTY-FIVE FRENCH BEAN (*PHASEOLUS VULGARIS*) VARIETIES

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Abstract

Twenty-five French bean varieties were examined for their physical characters like colour, pod type, pod weight, average length, breadth, string value and chemical compositions viz., dry matter, alcohol insoluble solids, starch, total sugars, glucose, fructose, crude protein, iron, potassium, phosphorus, ascorbic acid, β-carotene and chlorophylls. Varietal differences in these compositions were noted. Superior varieties with desirable characters and high nutritional value are suggested as promising in terms of quality and their scope of utilization.

Introduction

Studies on the physico-chemical composition in bean varieties are of practical significance in suggesting their edible quality as well as their scope of utilization in processing industries. Besides, it serves as a guideline in identifying superior varieties with respect to their nutritional quality. In addition to their characteristic chemical composition, various physical parameters like colour, flavour, pod type and string value are used as quality factors in rating varieties for canning, freezing and dehydration.[1,2] The practical utility of nutritional evaluation of germ plasm of fruits and vegetables in identifying superior genotypes has been reported earlier.[3-6] In the absence of basic information on the compositional quality, a study was undertaken with twenty-five promising French bean varieties being evaluated under the bean improvement project of this Institute. The variations observed in the physico-chemical composition of different varieties and the importance of such information in establishing varieties with specific use are discussed in this communication.

Materials and Methods

Twenty-five varieties of French beans (listed in Table 1) grown at the experimental station, Hessaraghatta, were used for this study. About 1 kg pods of uniform size and maturity were harvested. Observations on the physical characters like colour, pod type, average pod weight, pod length, breadth and string values were recorded by the accepted methods. Dry matter, alcohol insoluble solids, starch, total and reducing sugars, total chlorophylls, ascorbic acid and β-carotene were estimated by standard AOAC methods.[7] Fructose was estimated by Resorcinol-thiourea method.[8] Sucrose was calculated by multiplying the difference

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between the total and reducing sugars by 0.95. Glucose values were obtained by subtracting fructose content from reducing sugar values. The oven dried samples were used for nitrogen estimation and the values were multiplied by 6.25 to get crude protein content. A known weight of oven dried material was digested with tri-acid mixture (Nitric acid: Sulphuric acid: Perchloric acid::10:1:1) and the digested material was used for the estimation of phosphorus, iron and potassium.[9,10]

Results and Discussion

The physical characteristics and chemical composition of twenty-five French bean varieties grown under the agro-climatic conditions of Hessaraghatta, Bangalore, are presented in Tables 1 and 2.

Varietal characters such as size, shape, fibreness and colour are known to effect the quality in French beans. Hence observations on pod type, size, pod weight and string value were recorded in all the varieties studied. These attributes coupled with chemical composition and organoleptic quality suggest the basic requirements of individual varieties with respect to their specific uses. French bean varieties with attractive appearance, long straight tender pods of medium size, thick wall, small seeds, free from fibre and strings are generally preferred for processing purposes like canning, freezing and dehydration. Based on the observations recorded on pod type, different French bean varieties can be classified under round and flat pod, with straight or curved nature. Cylindrical shape in cross section is a positive character in beans for canning, freezing etc., and this can be expected in varieties having round pod type. Average pod length, breadth and pod weight ranged from 7 to 16.6 cm, 0.6 to 1.3 cm and 3.6 to 10.5 grams respectively. These informations are useful in characterizing the size and shape categories in beans. It is also useful where uniformity in size is more important and when a restriction is stipulated on the minimum and maximum size. The fibre sheath in French bean is an important textural property and varieties with low string values are generally recommended for processing. It is also reported that to be acceptable for dehydration, a variety must be one in which the development of fibrous layer in the side wall of the pericarp is minimum in amount and begins late in the growth of the pod.[11] Varieties like Cello, HWSA, Prochesor, Royal Purple Pod, Top Noth Golden Wax and West German Bush had low fibre content as compared to the remaining varieties. All these observations revealed the existence of favourable size, colour, shape and textural properties in a few bean varieties under study and such varieties may be considered promising ones with respect to specific qualities.

The colour in beans is an important quality which influences the consumer preference and product quality considerably. Bean varieties with uniform bright green colour are preferred for canning and freezing. The pod colour of different bean varieties studied ranged to green, yellow and purple. These colour variations are mainly attributed to the genetic characteristics of individual varieties. The colour value of different varieties as expressed in terms of concentrations of total chlorophylls and the ratio of chlorophyll *a*/ chlorophyll *b* ranged from 1.1 to 6.3 mg per cent and 1.36 to 3.19 respectively. Retention of bright green colour after blanching during processing is a desirable character and obviously this phenomenon can be expected in varieties with high chlorophyll concentrations. In addition to providing characteristic colour value, the ratio of chlorophyll *a* to chlorophyll *b* is reported to be a guiding factor of maturity index and are useful in determining the characteristic growth stages.[12]

The study on the chemical composition

TABLE 1. *Physico-chemical characteristics of French bean varieties*

Variety	Pod type	Average pod wt (g)	Average pod length (cm)	Average pod breadth (cm)	Fibre or string (%)	Total chlorophylls (mg%)	Chlorophyll a / Chlorophyll b ratio	β-Carotene (μg/100g)	Vitamin C (mg %)
AC 8986 (Kenya 1)	Round, straight	7.2	14.3	0.8	1.6	5.2	2.04	144.6	13.7
AC 8987 (Kenya 2)	Round, straight	8.4	12.6	0.9	1.0	5.8	3.19	139.8	12.8
AC 9389 (Kenya 3)	Round, straight	5.6	16.6	0.7	3.9	6.3	2.05	129.0	13.7
Blue Lake Stringless	Round, straight	10.5	15.2	1.0	2.0	4.1	1.83	148.8	10.8
Cello (No. 1027)	Round, curved	3.6	7.0	0.6	0.4	2.7	1.68	133.2	12.3
Cher Staro Zagorski (Bulgaria)	Flat, straight	7.6	10.0	1.2	1.0	1.9	1.59	130.8	9.4
Contender	Round, curved	9.0	13.9	0.9	3.5	4.7	2.18	126.6	16.3
Eastern Butter Wax	Round, straight	7.5	14.9	0.8	1.3	0.5	1.57	168.0	10.3
EC 39439	Round, straight	7.0	13.1	0.8	1.6	3.5	2.17	132.6	15.1
EC 57083	Flat, straight	5.2	15.0	1.0	2.0	6.0	2.11	132.6	10.3
EC 57258	Round, straight	6.2	10.4	0.8	1.6	4.7	2.46	131.4	8.6
EC 57261	Round, curved	4.0	8.0	0.8	1.6	5.3	2.14	146.4	14.3
HWSA	Round, straight	3.8	10.6	0.6	0.8	0.5	1.60	174.0	15.4
Maxidor	Round, straight	4.5	13·0	0.7	1.2	0.8	2.40	172.8	10.6
PI 320968 (Hungary)	Flat, straight	9.6	15.1	1.2	1.0	0.3	2.27	144.6	11.1
PI 339508 (Turkey)	Flat, straight	5.9	10.1	1.3	2.2	4.0	1.75	138.6	9.1
Prochesor	Round, straight	5.6	11.0	0.8	0.8	2.5	1.46	132.6	11.4
Pusa Parvathi	Flat, curved	4.4	10.5	0.7	2.4	1.1	2.14	133.8	20.8
Royalty Purple Pod	Round, curved	8.4	12.3	0.8	0.5	2.5	1.79	87.6	12.8
Silvert	Round, straight	6.8	11.2	0.8	2.0	4.1	2.07	118.8	13.4
Top Crop Snap Bean	Flat, straight	6.0	11.9	1.2	2.4	2.8	2.05	156.6	16.0
Top Notch Golden Wax	Flat, straight	5.6	10.4	1.0	0.2	3.4	2.25	171.6	14.0
Topi	Round, straight	8.4	13.0	0.9	2.0	4.1	2.22	138.0	13.1
Trifa	Round, straight	7.2	15.2	0.6	4.2	5.8	2.14	126.2	12.5
West German Bush	Round, straight	4.8	11.4	0.8	0.9	2.8	1.36	126.0	10.6

of different bean varieties revealed that considerable variability existed among varieties. The range of values are: dry matter 9.2 to 15.9 per cent; alcohol insoluble solids 4.3 to 10.1 per cent; starch 0.33 to 1.45 per cent; total sugars 1.96 to 3.28 per cent; sucrose 0.16 to 1.07 per cent; glucose 0.16 to 1.73 per cent; fructose 0.76 to 1.78 per cent;

TABLE 2. *Chemical composition of French bean varieties*

Variety	Dry matter %	Alcohol insoluble solids (%)	Starch (%)	Total sugars (%)	Sucrose (%)	Glucose (%)	Fructose (%)	Glucose / Fructose Ratio	Crude* Protein (%)	Iron (mg%)	Phosporus (mg%)	Potassium (%)
AC 8986 (Kenya-1)	10.8	6.3	0.71	2.25	0.30	0.61	1.32	0.46	1.51	1.3	34	0.101
AC 8987 (Kenya-2)	9.6	6.2	0.61	2.38	0.31	0.99	1.01	0.99	1.42	1.1	31	0.108
AC 9389 (Kenya-3)	9.4	5.8	0.43	2.84	0.26	1.18	1.36	0.87	1.47	1.4	33	0.106
Blue Lake Stringless	12.8	5.8	0.65	3.28	0.45	1.02	1.78	0.57	1.92	1.2	32	0.112
Cello (No. 1027)	14.0	8.9	1.42	2.18	0.41	0.68	1.07	0.64	1.90	1.8	31	0.105
Cher Staro Zagorski (Bulgaria)	11.6	7.1	0.86	1.96	0.29	0.88	0.88	1.00	1.85	1.2	28	0.107
Contender	10.9	6.9	0.86	3.16	0.94	0.68	1.49	0.46	1.47	0.8	30	0.108
Eastern Butter Wax	9.8	5.2	0.45	2.71	0.30	1.12	1.29	0.87	1.40	1.1	23	0.114
EC 39439	10.1	7.6	0.84	3.02	0.51	1.43	1.05	1.37	1.51	1.4	28	0.108
EC 57083	9.2	4.7	0.65	2.33	0.17	1.39	0.76	1.83	1.26	1.3	21	0.105
EC 57258	9.2	4.9	0.55	2.98	0.16	1.73	1.08	1.59	1.35	1.2	27	0.110
EC 57261	13.3	7.1	0.86	1.97	0.25	0.89	0.82	1.07	1.95	1.9	29	0.115
HWSA	11.5	7.0	0.69	2.85	0.33	1.47	1.04	1.42	1.54	1.6	19	0.106
Maxidor	9.2	5.0	0.45	2.89	0.43	1.10	1.34	0.82	1.41	1.1	27	0.110
PI 320968 (Hungary)	9.7	4.3	0.33	2.60	0.30	0.79	1.47	0.54	2.00	1.2	22	0.108
PI 339508 (Turkey)	11.5	7.8	1.45	2.44	0.38	0.76	1.29	0.59	1.64	1.5	27	0.103
Prochesor	10.7	6.9	1.01	2.16	0.18	1.13	0.84	1.13	1.41	1.4	20	0.101
Pusa Parvathi	12.8	9.6	1.16	2.16	0.20	0.68	1.27	0.54	1.76	1.8	25	0.102
Royalty Purple Pod	15.9	10.1	1.27	2.52	1.07	0.16	1.23	0.11	2.89	2.0	37	0.135
Silvert	9.9	7.4	1.26	2.42	0.43	0.82	1.15	0.72	1.39	1.2	25	0.114
Top Crop Snap Bean	11.4	7.3	0.78	2.58	0.47	1.49	1.59	0.93	1.72	1.4	32	0.104
Top Notch Golden Wax	10.0	8.3	1.00	2.21	0.21	0.97	0.82	1.17	1.55	1.2	24	0.110
Topi	10.7	5.2	0.58	2.52	0.23	1.08	1.19	0.90	1.58	1.4	31	0.106
Trifa	9.5	6.3	0.67	2.14	0.13	0.68	1.32	0.51	1.51	1.0	29	0.102
West German Bush	10.0	5.1	0.40	2.99	0.16	1.45	1.36	1.07	1.34	1.4	20	0.112

*On dry weight basis

glucose: fructose ratio 0.11 to 1.83; crude protein 1.26 to 2.89 per cent. Like majority of vegetables, the palatability and taste in beans are closely associated with the amount of characteristic compositions present, hence such studies are useful in the assessment of their edible quality. The dry matter content was highest in Royal Purple

Wax pod. The wide variation observed in dry matter content indicates that yield gains can be achieved through breeding for higher proportions of dry matter. Alcohol insoluble solids generally consists of starch, cellulose, fibre, pectin, etc., and its estimation in French beans generally serves as a good index of maturity. Standard values can be fixed for individual varieties at optimum maturity and increase from this value indicates a delay in harvest. Such informations are of practical utility in the quality control of beans used for processing. Carbohydrate pattern showed a marked variation among different varieties. Similar variations were noticed in glucose, fructose values. Varieties like Blue Lake stringless, Contender, EC 39439 recorded more than 3 per cent total sugars. These high sugar values are preferred in beans as taste factors. For dehydration, varieties with high sugar content are better than varieties that are inclined to be starchy or low in sugar content. Starch content is correlated with textural properties like mealiness in beans and hence exerts significant influence on their edible quality.

Higher values of ascorbic acid and β-carotene contents in bean varieties are desirable since there is a considerable loss of these vitamins during processing.[13,14] Among the bean varieties analysed, ascorbic acid and β-carotene contents ranged from 8.6 to 20.8 mg per cent and 87.6-174 μg/100 gram respectively. It is reported that ascorbic acid content is higher in green beans compared to white ones and higher in small beans compared to large ones.[15] No such conclusions could be drawn from our present study. Carotenoids in beans are also considered important since β-carotene is the precursor of vitamin A. Pentzer[16] reported that the β-carotene retention on dehydration was related to colour retention in some bean varieties and hence higher values were preferred. Varieties with high β-carotene content can be incorporated in breeding programme to improve the nutritional value in beans.

The concentration of mineral constituents like iron, phosphorus, potassium ranged from 0.8 to 2.0 mg per cent; 19 to 34 mg per cent; 101 to 135 mg per cent respectively. Varieties with maximum concentrations are pointed out as superior varieties with respect to their nutritional quality.

The desirable characteristics in French bean varieties are generally dictated by their intended use and hence the information on the physico-chemical composition as reported in this paper are of practical utility in suggesting the scope of their utilization. Varieties with higher nutritional value and desirable characters can be incorporated in breeding programme to evolve varieties with specific quality factors.

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Book Reviews

'*Specialized Sugars for the Food Industry*': by Jeanne C. Johnson, Noyes Data Corporation, Park Ridge, New Jersey, U.S.A., 1976, pp. 359.

Noyes Data Corporation in its series of Food Technology Review has brought out this publication No. 35 in the area of Sugars for the Food Industry. Detailed information in this book is based on U.S. Patents issued since the late 1960's on specialized sugars used by the food industry. This book supplies detailed technical information and can be used as a guide to the U.S. Patent literature in this field. It presents an advanced, commercially oriented review of specialized sugars as depicted in U.S. Patents. It also provides description on number of technical possibilities available, which may open up profitable areas of research and development. The information in this book covers 221 patents mostly issued since 1969. This includes patents on fructose, corn syrup and dextrose processes, invert sugars and other sugars and their derivatives.

There are fourteen chapters dealing with various sugars with respect to their production and uses, etc. The first chapter deals with invert sugars. Details regarding production, chromatographic separation using ion exchange resins treated with different chemicals, crystallization and separation processess using double salt of $CaCl_2$ and NaCl, alcohol-glycol mixtures and methanol are given. Production of granular mixed sugars and uses of invert sugars in the confectionery industry are discussed.

In the next three chapters, details regarding different methods of production and their uses of low dextrose syrups, high dextrose syrups and solid dextrose (Glucose) are covered. Hydrolysis process, two stage enzyme process for low dextrose syrups, production of low dextrose hydrolysates from waxy and non-waxy starches, non-hazing of low dextrose syrups and their uses in confectionery and beverage industry are given in the second chapter. Third chapter deals with different methods for preparing high dextrose syrups and their purification. Products containing high dextrose syrups such as soft sugars and stage iron-corn syrup composition are also incorporated in this chapter.

In the fourth chapter, spray drying and other drying methods for the production of solid dextrose without removal of the mother liquer have been discussed. This chapter also contains methods for production of dextrose hydrate crystals and other crystallization processes for production of coarse dextrose crystals, granular dextrose, crystallization of anhydrous dextrose products containing dextrose and glucose derivatives such as mono diacetone glucose, methyl glucoside, chromium glucose food supplements and parenteral infusion compositions.

Next chapter deals with enzymatic production of fructose including production of glucose isomerase, isomerase conversion of glucose, enzymatic conversion of starch or starch syrups, production and use of bound isomerase.

Other processes for production of fructose, separation or purification of fructose, information on solid or crystalline fructose and fructose containing products are covered in sixth chapter. Different methods for production of maltose, xylose, lactose and lactulose are covered in chapters seven to

ten. In chapter eleven, production of miscellaneous sugars such as Gentiobiose, D-Arabinose, D-Ribose, L-Sorbosone and Mannose is given in detail. Maple sugar processing apparatus, honey products, hydrolysis of raffinose and sugar blends are also included.

Miscellaneous sugar processes such as enzymatic saccharification of cellulose, fermentation of hydrocarbons, diabetic saccharide condensates and photochemical process without chlorophyll are covered in chapter twelve. Production of sugar alcohols such as mannitol and maltitol, chromatograhic separation of mannitol and sorbitol and derivatives of sugar alcohols are discussed in the next chapter. In the last chapter, different methods of production of sugar acids such as Gluconic acid, 2 Keto-L-Gluconic acid etc., and their derivatives are covered.

At the end of the book, company index, inventor index and U.S. Patent number index are enlisted which are highly useful to the manufacturers of food products and research workers for seeking further details in their interested areas.

This volume compiled by Jeanne C. Johnson provides the detailed information based on U.S. Patents on various methods for the production and uses of different sugars used in the manufacture of food products. This book also provides information on the chromatographic separation of sugars and their purification which is useful for the research workers. The book is useful to the manufacturers of fruit and vegetable products, confectionery and bakery products and would be a welcome addition in the library of any teaching or research and development institution concerned with food technology. Printing and presentation are of high standard, but the size of the letters in the text are slightly smaller.

M. Mahadeviah

'Tea and Soluble Tea Products Manufacture': by N. D. Pintauro, Noyes Data Corporation, N. J., U.S.A., 1977.

This informative book is the 38th Food Technology Review published by the Noyes Data Corporation dealing with Tea and Soluble Tea Products. Like other compilations of the above Review, the present one also covers basically the patent literatures published in U.S.A. and Britain. Written mainly with the view of providing commercial literature for use in research and development, the book covers various aspects of commercial tea processing in 9 chapters starting from Sorting to the Final Bru of Tea in cups. The matter is arranged in the order of processing and end-use. The earlier aspects of tea processing along with the latest techniques like agglomeration has found a place in the book. The information is presented as chapters covering aspects pertaining to each processing step.

Chapter I covers various aspects on withering and rolling with high speed cutters, CTC machines, an additive to break the cellulose structure.

The information on sorting processes like fibre separator, stalk remover, stalk gravity separation, controlled fermentation by artificial conversion, comminuting leaves in frozen condition, pressure conversion, enzyme conversion, oxidative conversion with ozone and hydrogen peroxides and other oxidising agents are also included in the Chapter II.

The extraction Patents in Chapter III include use of peroxide, selective extraction, cold extraction and countercurrent extraction, besides use of CO_2 under pressure, ammonia and solvents, combined extraction with fermentation and problems in use of hard water for extraction.

The Tannin-Caffeine precipitate known as Cream has been covered in detail in Chapter IV. The importance of this in

cold soluble instant tea needs no elaboration. Many methods are now available using techniques as direct precipitation, oxidation, alkali solubilisation, enzyme treatments and the use of polyamides and polyvinyl pyrolidine.

Chapter V on Filtration and Concentration describes methods like hydrophilic membrane concentration, freeze concentration and pectinase treatment.

Drying developments in vacuum drum drying, foam mat drying, freeze drying are mentioned in Chapter VI. The patents on the methods available for controlling bulk density are noteworthy.

Chapter VII on Aroma Recovery techniques deals with steam stripping, use of inert gas, aroma stabilisation and fixation.

Various methods available for agglomeration and aromatization have been mentioned in Chapter VIII. The General Foods agglomeration process and Salada agglomeration process are commercially successful.

In the final chapter, the developments in tea bags, tea bag receptacles and Tag Enterlocks are discussed with diagrams.

The coverage in the compilation has been thorough and the details given are sufficiently informative for research workers and the industrial managers. The book has been nicely bound and compact with appropriate indices. The book will be an useful addition to the library covering Food Science and Technology, especially on beverage industry.

P. K. RAMANATHAN

Bee and Honey Patents of the World: by Oliver S. North, 8125, Ode Street, Arlington, Va 22204, U.S.A.

Patents provide a very valuable source of information for those engaged in research and development activities. Thousands of patents are being filed on a variety of subjects in different parts of the world. But information retrieval from such patent literature is extremely an arduous and expensive proposition, beyond the reach of many engaged in active research investigations. In the case of industries also, the benefit of patent publications is not very much since most of them have neither access nor knowledge about such publications.

Honey is one of the natural food materials consumed all over the world due to its several quality attributes. Especially in India production of honey is a cottage scale operation, following age-old traditional techniques. It is a welcome development that a compilation has been done to cover all the information on honey available through patents in English as well as other languages.

The publication under review includes reproduction of complete patents on processes and compositions relating to (1) Beekeeping; (2) Honey processing and packing; (3) Honey beverages and beverage powders; (4) Honey butters and spreads; (5) Other honey foods; and (6) Bee and honey health products and medicines. It is also claimed by the author that he has been able to cover even duplicate patents issued in more than one country. While one version is reproduced in full, the duplicates are itemised in a separate page under 'Concordances' in the Appendix. No attempt has been made, however, to collate patents pertaining to hives, supers, honey extraction equipment, smokers and other contraptions related to honey.

The book has been able to cover 125 patents, which if purchased would cost the buyer $ 75.00. In absence of a price tag on the publication, it is presumed that it costs considerably less for any one to procure it for reference purposes. It is indeed useful to bee-keepers and producers of honey-based foods and other products since it avoids the necessity of identifying import-

ant materials from abstracts and procure them afterwards at considerable cost and delay.

V. H. Potty

Annual Fertilizer Review—1975

This annual review has been released by the Food and Agriculture Organisation (FAO) of the United Nations in the year 1976. Descriptive matter has been described in three languages, i.e. English, French and Spanish. It consists of 28 main tables and 13 tables in the appendix. The main tables 1-8 give the details about the production, consumption, trade and available supply of Nitrogen, Phosphate and Potash fertilizers and their per cent changes by economic class. It also describes the contribution of economic classes and regions to the Word production and consumption. It also outlines the estimated production of technical grade potash and potash re-exports in the form of complex fertilizers which is quite useful information.

Various consumption indications have been given in Tables 9-12, such as consumption ratio $N:P_2O_2:K_2O$ when $N=1$ *per capita* consumption of all fertilizers, fertilizer consumption per hectare of arable land and land under permanent crops, fertilizer consumption per hectare of agriculture land.

Tables 13-15 describe the production, import export and quantities of Rock Phosphate used for direct application.

Tables 16 and 17 describe about fertilizer price and Tables 18-24 give the details about New Fertilizer plants in countries such as Africa, North and Central as well as South America, Asia, India, Europe and U.S.S.R. Tables 25-28 give fertilizer capacity and forecast about NPK fertilizers. This will be very useful information for setting up of new fertilizer units.

Tables I-XIII given in the appendix describe about production, imports, exports, consumption of NPK fertilizers.

This review, compiled with the help of computers, will be very useful for planners, industrialists and farmers.

Gurdeep Kaur

The State of Food and Agriculture, 1975: by FAO of UN, Agriculture Series No. I.

The State of Food and Agriculture, 1975, is a revised version of the mid term review and appraisal of the progress in the Food and Agriculture Sector during the Second United Nations Development Decade, covering the 1970s.

The book has a wide coverage and provides a clearcut picture of the Agri. Production, Agri. Trade in various years, Stock of Agricultural Products, consumer food prices, Agricultural production requisites like energy supplies, fertilizers, pesticides, Production and trade policies pertaining to Fisheries and Forestry. Besides this, it also covers international trade, international rural institutions and services, cereal supplies and stocks, farm prices, income and employment and the various production resources.

Besides the comprehensive description, the information has also been presented in the form of tables and annex tables, and thus increases its utility manifold.

Some of the highlights of this report/book are as follows:

World Food and Agri. production is estimated to have increased by 2 to 3 per cent in 1975. Output in the developed countries increased by only 1 to 2 per cent, but in the developing countries, it rose by 4 to 5 per cent, contrasting favourably with the discouraging results of 1974. The 2 to 3 per cent increase in world livestock production in 1975 largely reflects increased slaughterings prompted by the serious problems which continue to affect the sector, high prices and scarcity of cereal fodder,

and weak demand in industrialized countries due to the economic recession. World fishery production rose by 6 per cent in 1974 mainly as a result of increased catches by Chile and Peru and the far ranging fleets of the U.S.S.R. and other centrally planned countries. Much of the increase was in fish used for reduction to fish meal and oil, but landings for direct human consumption also increased. Even with subsequent good harvests in most developing countries in 1975, food and agricultural production in the developing world has increased much more slowly and has fallen behind the growth of population. The food imports of the developing countries have risen much faster than their agricultural exports and many of them face grave difficulties in financing essential imports of food and fertilizer. The annual rate of growth in India is 2.2 per cent whereas domestic demand for food is 3.0 per cent. The *per capita* daily dietary energy supply is 2070 calories and the protein supply is 52 grams.

This book thus serves as a ready reference for Agriculturists, Nutritionists, Economists and for all others who are directly or indirectly associated with the field of Agriculture and are endeavouring to solve the food problem of the world.

F. C. SHUKLA

Yearbook of Fishery Statistics—Catches and Landings, Vol. 40, 1975.

1. This volume of the Yearbook of Fishery Statistics presents, for the six calendar years 1970-75, the annual statistics on nominal catches on a world-wide basis with detailed breakdowns by (*a*) countries, (*b*) species and (*c*) major fishing areas.

2. India is a major producer of fresh water fishes. But in sections B 11 to B 25 where these species are included, India does not figure at all.

3. In the nomenclature of Indian fishes (E-4) an attempt to conform to internationally known names has been made—These names often do not truly represent the particular fish. The net result is that a seeker of information does not get what he wants. For instance, *lactarius* (white fish); it is not clear which terminology is used to represent this fish. Seer fish (*Scombridae*) is another instance. Silver bellies are better-known by that name than 'Pony fishes'. Such inconsequential species 'Pompanos' (?) (catch=00) have been included.

The Year Book Volume 40 on the whole contains very useful information on fishery statistics and catches.

M. N. MOORJANI

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NOTES and NEWS

- *Crocodile Farming*
- *Problems with Frozen Meat*
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- *World Tea Production*
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Crocodile Farming

About 20 years ago people feared to go inside Tikerpada gorge in the Mahanadi infested with gharials (crocodiles); only hunters visited the spot. The gharial population came down sharply after the area was opened up for the construction of a dam. A joint venture is taken up by the Govt. of India, the Govt. of Orissa and the FAO to launch 'Project Crocodile' in Cuttack district for farming of crocodiles.

A few gharial species are available in the Gandak river in Bihar. Gandak river, known as Narayani in Nepal, produces adequate quantity of eggs and has enough crocodiles. The gharial eggs are brought from Nepal to Tikerpada project where they are hatched under artificial conditions. Tikerpada is chosen because it is ideally suited for breeding with its high sand banks and fast flowing water. The results of artificial hatching have been encouraging.

It is a wrong impression that the mother crocodile has little attachment to her young ones. After laying the eggs the mother stands guard till the small ones emerge out. Every time she crocodile lays 40 to 50 eggs. It becomes difficult for her to keep the young ones away from the predators. The mortality rate is as high as 80 per cent in nature which has been brought down to 10 to 20 per cent under artificial conditions.

The conservators keep them at different ponds built for crocodiles of different age groups. They are let of after a year or so when they reach an optimum size. At this stage they are not victims of predators and can defend themselves.

Rise in the number of crocodiles does not affect the fish population. Crocodiles do not like scaled and scale-less fish. *Otters* are the top favourites of crocodiles, who are the greatest predators of fish. The presence of crocodiles increases the fish population.

The reasons for the fast depletion of crocodile population are:

1. Indiscriminate shooting for pleasure and money.
2. Large scale use of nylon nets. Once the crocodiles get caught in the nylon net, they cannot come out of it.
3. Habitat alienation due to developmental projects.

Crocodile farming is a good business. Crocodile skin is much in demand in overseas markets. Crocodile is eaten as a cure for T.B. and Asthma. Its fat is an important ingredient for medicines.

Problems with Frozen Meat

A Symposium was organized by the Food and Agriculture Organization of the United Nations (FAO) in Budapest. A report was transmitted by the Government of the Federal Republic of Germany on the basis of paper by Mrs Dr Irmgard Schon, FAO/WHO Codex Committee on Meat, Meat Research Institute, Kulmbach, on

'Variation of muscle and fat criteria and their possible effects on the quality of frozen meat'.

Even at performance of optimum technical assumption, the freezing suitability of the raw material has shown different results caused by the variation in the composition of the carcasses and in the constitution of musculature and fatty tissue within and between the species.

In the musculature are the chemical nutrition components: protein, fat, water content, water-binding capacity, pH value, texture and the constitution of the muscle fibres. The stability of the frozen meat is influenced by the firmness of the fatty tissues and depends on the nutritional composition, constitution of the fat cells, and the fatty acids relation. The meat and fat content of veal, beef, pork, lamb and mutton give rise to specific technological and nutritional problems.

The dietetic value of veal is influenced by high water content, relatively high proportion of multiple unsaturated fatty acids and their stability.

The problems related to qualitative and quantitative slaughter criteria in broiler and turkey are relatively less, because breeding, feeding, keeping, slaughtering, chilling and the method of deep freezing are well standardized. Quality deficiencies are mostly based on the non-observance of the chilling and freezing process, temperature and duration of the storage or of the thawing method.

The purpose of later utilization should be considered at selection of the raw material for freezing. Meat for the fresh meat consumption has to fulfil stronger requirements than the frozen meat used for processing. Problems may also appear during the processing due to deficiencies of the raw material like PSE and DFD in the musculature or anomalies of consistency in the fatty tissue, causing inefficient binding capacity and stability.

Threat of Mycotoxins

Eighteen recommendations made at an international conference on mycotoxins (harmful fungi which contaminate food) were adopted in Nairobi at the conclusion of a one-week session. Thirty-seven States were represented at the conference, held under the joint auspices of the Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the United Nations Environment Programme (UNEP).

The recommendations aimed at practical action to be undertaken on such matters as field practices, insecticides, harvesting and crop drying methods, storage on farms, in markets and warehouses, transportation practices and post-harvest processing.

The guidelines were laid down to prevent mycotoxins in human food, animal feed and their products.

According to one recommendation, mycotoxin reference standards are to be prepared to facilitate prevention and control, and financial aid to developing countries will be sought for this costly exercise.

Governments were advised to set up surveillance programmes to determine the incidence and sites of mycotoxin contamination at each stage; from production, through harvesting, storage and processing, to consumption.

To facilitate international trade in commodities likely to be affected by mycotoxins, the conference recommended that 'International harmonization and agreement' should be established through bodies such as the joint FAO-WHO Codex Alimentarius Commission. It was also proposed to start a newsletter, mainly for developing countries, to help disseminate relevant information.

UNEP was anxious to help those developing countries which exported products likely to be affected by mycotoxins, such as groundnuts and maize.

World Tea Production

The World tea production rose considerably during 1975 as shown below:

	Production (in tons)		evolution index
	1964	1975	1964=100
India	372,486	489,393	131.4
China	233,965°	338,000°	144.5
Sri Lanka	218,513	213,679	97.8
Africa	62,559	133,462	213.3
Japan	83,280	105,448	126.6
U.S.S.R.	47,400	86,000	181.4
Indonesia	46,386	57,000	122.9
Turkey	10,035	50,000°	498.3
Iran	10,478	47,000°	448.6
South America	21,741	44,000°	202.4
Bangla Desh	28,233	29,343	103.9
Taiwan	18,306	26,092	142.5
	1,153,402	1,619,417	140.4

Sugar Conference

The United Nations Sugar Conference concluded in Geneva on September 30, 1977. Six major sugar producing countries will share 70 per cent of World's free trade.

Cuba has been assigned the largest quota of 2.5 million tonnes

Australia 2.4 million tonnes

Brazil 2.1 million tonnes

Philippines 1.5 million tonnes

Thailand 1.2 million tonnes

The Dominian Republic 1.1 million tonnes

The total mentioned for 6 exporters amounts to 10.8 million tonnes, a little more than 70 per cent of the total of the world free trade in sugar.

Some of the minor sugar exporters have expressed unhappiness over the proposals and have requested for higher quotas.

The exporters have sought the minimum and maximum price limit of 13 and 23 cents to be recognised.

Efficiency in Water Use

Countries from Asia and the Pacific region have called for greater efficiency in water use in view of the heavy and increasing cost of new water projects.

This is one of the decisions of the fourth session of the Natural Resources Committee of the Economic and Social Commission for Asia and the Pacific (ESCAP), which ended its meeting in Bangkok on 22 August.

Improvement in the efficiency of water use is needed in connection with water used for agricultural, industrial and municipal purposes.

The report has recommended appropriate pricing policies in order to improve water usage efficiency, to cause undue hardship to or discourage the use of sufficient water by the poorest among the beneficiaries.

The report calls on countries to adopt as a general principle, that direct or indirect costs attributable to pollution should be borne by the polluter.

This would minimize pollution, encourage efficiency in water use, and provide equitable cost allocations.

Countries at the meeting recognized the need for integrated planning and management of water resources. The meeting agreed that there was a 'general need' for a national organization to provide a basis for representation of comprehensive water interests in national development planning.

The organization would maintain a national data bank on the occurrence and quality of water resources.

It would also be responsible for developing and standardizing procedures for multi-disciplinary assessment of water resources management projects and the promotion of multi-purpose projects.

The Committee also recommended that individual countries, and the international community, should make the maximum

possible use of capabilities available in the region when seeking or arranging technical assistance and in implementing projects.

'Technical co-operation among developing countries should automatically be an early consideration in the planning of any activity'.

H.P. Fruit Output

Kulu and Simla districts enjoy the reputation of growers of delicious apples and Kinnaur is known for its almonds and chilgozas; Mandi has the distinction of growing apples, mangoes and a large variety of stone and citrus fruits.

The inspiration for fruit cultivation has come from Kulu, the entire fruit out-put of which has been passing through Mandi district for nearly quarter of a century. It was the incentives provided under the Indo-German package programme that put Mandi on the fruit map of Himachal Pradesh.

Gifted with three distinct climatic zones —temperate, sub-tropical and tropical—the district occupies second place in Himachal Pradesh on the basis of orchard population. The area under various varieties of fruits took a big leap forward from 160 hectares in 1961-62 to over 9,173 hectares at the end of last year. Of this over 4,475 hectares was under apple.

Fruit production in the district touched 45,000 tonnes last year as against 300 tonnes in 1961. This year, due to unfavourable weather conditions fruit production in the district is estimated at 30,000 tonnes.

The establishment of a fruit processing plant at Jarol under the Indo-German package programme and development of orchard areas under a World Bank project have been responsible for the big boost to fruit production which in turn has transformed the economy of the villages. At present, 13 progeny-cum-demonstration orchards in the district are engaged in production of disease-free progeny fruit plants for temperate and sub-tropical zones. An olive station is also functioning in the district to find out suitable olive varieties to be used on a commercial scale.

Last year, 4,38,343 fruit plants were produced in Government orchards out of which 2,83,825 were sold to orchardists. Besides 45,993 fruit plants of different kinds were exported.

Apart from advisory services given to orchardists, horticultural extension activities undertaken last year included spraying of 2,47,604 plants and trimming and pruning of 1,94,640 fruit plants.

Incentives for Industries

Assam has an area of 78,523 sq. kms. and according to the 1971 Census, the population was 14.63 million with a density of 150 per sq. km. The State is divided into two distinct physical regions of almost equal size, namely the hills and the Brahmaputra Valley. There is abundant forest wealth and the forests extend over half of the total geographical area of the State. Assam is rich in minerals resources. 70 per cent of the population depends upon agriculture.

With the development of infra-structure like power, transport etc. over the years, the process of industrialisation has been set in motion and there has been a significant improvement in the field of industries. There is scope for development of small industries in the State.

The State offers a number of facilities and incentives for industries. Industrial Estates have been established at Gauhati, Tinsukhia, Nalbari, Jorhat, Dhekiajuli, Bodarpur, Sibasagar and Nowgaon and built-up sheds and developed land for industries are also provided in many other places in the State. Developed plots in selected industrial areas and built-up sheds

in Industrial Estates are allotted to entrepreneurs on suitable terms and conditions. The allotments are made either on rental basis or on hire-purchase basis or on outright purchase basis. Plots are sold on no-profit-no-loss basis.

Power subsidy upto 9 paise per unit is available to small scale industries. In the case of industrial units with electric power constituting a major part of the cost of their production, power is supplied at negotiated rates. In respect of selected industries having definite prospects in the State, the State Government gets the feasibility studies prepared free of cost through its own agencies.

Concession is allowed in sales tax on industrial raw materials/finished products, on the merits of each case. A price preference of 15 per cent is allowed to local industrial products on the price quoted by the outside suppliers, for all Government purchases. Local raw materials are made available to cottage industries at subsidised or economic rate to meet the actual requirements of the working artisans.

Industrial loans upto Rs 20,000 are available under State Aid to Industries Act against the mortgage of immovable property. Loans upto Rs 7,500 in the case of technical entrepreneurs and upto Rs 5,000 for others are given against security. Loans above Rs 20,000 are given by the Assam Financial Corporation. The Corporation provides loans upto Rs 3 million in the case of companies and co-operatives and upto Rs 1.5 million in the case of non-corporate units. The effective rates of interest charges vary between 10.5 per cent and 13.5 per cent. These rates get reduced by one per cent if refinance facility is available. Lower rates are charged from small scale units and the units in backward districts.

Assam Industrial Development Corporation arranges term-loans from financial institutions for entrepreneurs with viable projects. Assam Small Industries Development Corporation helps small scale industries by supplying machinery on hire-purchase and raw materials, providing industrial sheds and assistance for the marketing of products.

Export News

- *Budget Allocations*
- *Export Credit and Guarantee Corporation: Services to Exporters*
- *Post-Shipment Credit*
- *Sub-Standard Vessels for Export*
- *General Rate Increase*

Budget Allocations

The annual budget presented in Parliament on June 17 by the Union Finance Minister, Shri H. M. Patel, contains some measures for promoting exports.

The Commerce Ministry will incur an expenditure on foreign trade and export promotion schemes of Rs 283.78 crores in 1977-78 against Rs 295.32 crores in 1976-77. The object of these measures is to stimulate export trade and develop foreign markets for Indian products. The allocation represents expenditure on administration and promotion of exports like publicity, quality control, product promotion, market development, export subsidies.

Expenditure is incurred on product promotion, cash compensatory support for traditional and non-traditional items, subsidise interest on export finance extended to exporters through commercial banks and on grants to export development organisations like export promotion councils, Trade Development Authority, Indian Institute of Foreign Trade, Federation of Indian Export Organisations.

The budget envisages the setting up of a Trade Fairs Authority of India (TFAI) as a Government company with a capital of Rs 25 lakhs. This body will organise fairs and exhibitions in India and abroad as well as undertake commercial publicity for export. The TFAI has been given grant in aid worth Rs 132 crores and about Rs 2.21 crores for organising 22 trade fairs abroad during 1977-78.

An amount of Rs 4.35 crores is provided to the State Trading Corporation in respect of payment for exchange losses suffered by STC. Plan expenditure worth Rs 35 lakhs is allocated for the Tea Trading Corporation which markets packed tea in India and abroad and as expenditure for the commodity boards for tea, rubber, coffee and cardamom.

Rs 7.09 crores is ear marked for training, extension and development schemes for handicrafts. The export of handicrafts targeted for 1977-78 is Rs 125 crores.

The imposition of export duty on bulk tea has resulted in lowering domestic prices without adversely affecting exports. Exemption of packed tea, tea bags and instant tea from export duty is another measure designed to promote export of this non-traditional item.

Indian exports have been showing a satisfactory increase in the last few years. Exports stood at Rs 3,304.1 crores during 1974-75 exhibiting a 30.9 per cent increase over 1973-74 in value terms. Exports rose by 21.4 per cent in 1975-76 and touched a new high of Rs 4,980.60 crores during 1976-77, exhibiting a growth of 23.2 per cent in value terms over 1975-76.

Export Credit and Guarantee Corporation: Services to Exporters

Export Credit and Guarantee Corporation (ECGC) has introduced new schemes for promoting exports. It has introduced a scheme of giving post-shipment export credit guarantee to Commercial Banks against risks to the Indian exporters, not being able to repay the post-shipment advance availed of by them in the event of the buyer dishonouring the bill. The scheme will give a guarantee up to 85 per cent against 75 per cent cover offered under the present individual guarantee. The prem-

ium rate is 2.5 paise per cent per month as against 5 paise in the case of individual guarantees. The guarantee will be available only for post-shipment advances to exporters who have to cover their overseas risks under ECGC policy.

The government has cleared the scheme of insurance cover for export projects and civil construction of joint ventures to a third country.

So far ECGC had been taking 4/6 months for settling claims under performance guarantee. To create confidence among banks ECGC has decided to pay claims as soon as a bank certifies that it has in its turn made the payment to the foreign buyer.

ECGC has opened two new branches in July 1977 at Ludhiana and Bangalore.

The Ludhiana branch is located in the District Red Cross Society Building, the Mall, to help the exporters in Punjab, Himachal Pradesh, Jammu and Kashmir and the Union Territory of Chandigarh. The Bangalore branch at 40/1, Kempegowda Road, will cater to the needs of exporters in Karnataka State.

Shri M. K. Kapoor and Shri N. S. Pillai, who have been with ECGC for several years, are in charge of the Ludhiana and Bangalore branches respectively.

Shri S. C. Raheja has taken over as Manager of Delhi Branch.

Post-Shipment Credit

The Reserve Bank of India has directed the Scheduled commercial banks to charge concessional rate of interest of 8 per cent per annum on post-shipment credit extended for a period exceeding one year.

Certain goods and equipments which are not in the list of capital and producer goods having a high value are also included for such beneficial rate of interest.

Credit limits with banks allocated to exporters under the duty drawback credit scheme have been liberalised by the Reserve Bank of India.

The RBI has laid down new norms for fixing the credit limits on a realistic basis, specifying that the past export performance of the exporter and the anticipated duty drawback entitlement should be taken into account.

The liberalisation follows representations received by RBI from exporters over the inadequate credit limits fixed by banks.

Sub-standard Vessels for Export

The General Insurance Corporation will take stern measures to curb the tendency of Indian shipping agents to carry cargo in sub-standard vessels. The measures come in the wake of the representations that many foreign shipping operators who use such vessels have looted Indian shippers.

GIC now lays down that irrespective of age, size or classification every tramp vessel that carries the country's export cargoes will have to pass its approval test. It will refuse to grant the insurance cover to cargoes carried by any vessel not found up to the mark from August 1st, 1977.

GIC has asked shipping agents to forward to it full details of the vessels, owners, manager-operator and the charters involved in bringing the unapproved vessels to Indian ports for the carriage of Indian cargo.

General Rate Increase

The Bank Line Ltd. and the Scindia Steam Navigation Co. Ltd., who are operating a Joint Service from the Bay of Bengal to East Africa and Mauritius, have announced a 44 per cent rate increase in three stages, namely, 28 per cent from end July, 8 per cent from end October 1977 and 8 per cent from end January 1978. The Joint Service has also advised that there will be no further change in the rates structure for 15 months commencing from July 1977 and that special treatment for sensitive commodities will be considered on the merits of each case.

Foreign News

- *United Nations—Developing Countries' Share of Agricultural Earnings*
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- *Holland—Tech-transfair 1978*
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- *Nepal—ADB Loans*

UNITED NATIONS

Developing Countries' Share of Agricultural Earnings

The Food and Agriculture Organization of the United Nations (FAO) has reported in its annual 'Commodity Review and Outlook, 1976-77' that the long-term downward trend in the developing countries' share of world agricultural export earnings has been arrested.

The volume of world agricultural exports expanded slightly in 1976. The preliminary estimates indicate that overall improvement in prices of exports has risen in value by approximately 4 per cent to a total of U.S. $ 123,000 million. The export trade of developing countries has expanded by 12 per cent to about $ 38,000 million. Widespread price instability—which has been a major problem in most commodity markets since 1972—continued in 1976, providing further confirmation of FAO's conclusion that price fluctuations have become an increasingly severe phenomenon in commodity markets.

The short-term outlook, the Review stated, is for the expansion in demand for agricultural commodities generally, although the extent will vary from commodity to commodity. In the case of agricultural raw materials, demand is expected to grow at rates similar to those in 1976, but slower growth is anticipated in the demand for beverage crops, sugar and pepper. More rapid expansion is foreseen in demand for the more expensive food and feed commodities such as fish and oilmeal; the growth in consumption of cereals and dairy products is expected to be moderate and little change is foreseen in demand for bananas, citrus fruits.

Supply prospects for 1977-78, according to FAO's annual report, are for some recovery in the output of fats and oils and oilmeals, beverage crops and agricultural raw materials. Tighter supplies are anticipated for fishery products, mutton and lamb, beef and veal. Supplies of cereals and bananas, on the other hand, are likely to be easier, and sugar and dairy products will continue in surplus.

A moderate increase in world prices is considered by FAO likely to occur for fish, fats and oils, oilcakes and meals, mutton and lamb, beef and veal. An easier supply/demand situation and consumer resistance to high prices may exert downward pressure on the prices of most tropical products. Large crops and heavy stocks may continue to exert a downward pressure on international market prices of sugar.

FAO's Commodity Review foresees little overall change in the total volume of agricultural trade in 1977. These are prospects of improvement in the agricultural export earnings of developing countries.

The greater part of the additional export earnings from oilcakes and meals, which amounted to roughly $400 million in 1976, went to Brazil and India. The smaller exporting countries, such as the Philippines and Nigeria, also benefited.

Developing countries also made gains from exports of wheat, rice, bananas, oilseeds, meat etc., but their export earnings from sugar were severely reduced.

The value of agricultural exports from the centrally planned countries declined by about 15 per cent in 1976 to approximately $5,000 million. With a 40 per cent increase in exports of fishery products, however, and a 35 per cent rise in those of forestry products, the total agricultural exports of the centrally planned countries amounted to some $ 8,500 to $ 9,000 million or about 5 per cent below the 1975 level of $ 9,300 million.

Trade Promotion Bodies

Representatives of trade promotion agencies from within and outside of Asia and the Pacific met in Bangkok to consider ways and means whereby the developing countries of the region would be assisted in their efforts to improve trade relations with the industrial world.

Taking part in the meeting were representatives from India, Australia, Bangladesh, France, Indonesia, Iran, Japan, Maldives, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and U.S.S.R. Non-ESCAP countries present are the Federal Republic of Germany, Sweden and Switzerland.

The meeting was first of its kind convened by the Trade Promotion Centre of the Economic and Social Commission for Asia and the Pacific (ESCAP).

Mr J. B. P. Maramis, Executive Secretary of ESCAP, called on the participants to evolve steps to foster and strengthen trade relationships between the developing ESCAP countries and the developed countries within and outside the region.

The meeting aimed at enabling the participants to learn about the successes and failures of the efforts in their respective countries in trade promotion and export marketing.

International Tea Agreement

The World's major tea-producing nations are closer than ever before to an international tea agreement which would regulate world production and trade of tea, most probably through a combined system of price ranges and regulating stocks.

These nations agreed that every effort should be made to negotiate such an agreement as soon as possible, in accordance with a resolution of the fourth session of United Nations Conference on Trade and Development (UNCTAD).

Negotiations on the agreement are expected to start at an UNCTAD meeting in January 1978 in Geneva.

The consensus was reached after a week of discussions at the fifth session of the Intergovernmental Group on Tea held at the Rome headquarters of the Food and Agriculture Organization (FAO).

It was attended by participants from 38 exporting and importing countries and by representatives of the European Economic Community (EEC), UNCTAD, General Agreement on Tariffs and Trade (GATT) and other international organizations.

A study to examine the technical feasibility of storing tea and the advantages and disadvantages of various types of stocking arrangements, including definitions of indicator prices and trigger price mechanisms, should be organised. All possible assistance should be provided to countries with small tea production, including landlocked countries to assist them in the marketing of their teas.

The delegates unanimously agreed to support an 'intensive promotion campaign' to expand consumption of tea throughout the world, and 'a gradual elimination of tariff and non-tariff barriers to trade,' especially for the tea products of developing countries'.

Harmful Effects of Fats and Oils

Fats and oils are vital elements in man's food. But they sometimes contain substances that may constitute risks to human health.

The good and bad aspects of fats and oils in the human diet were examined recently by experts invited by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) to a joint consultation.

The potential contribution by fats and oils to human nutrition, particularly in developing countries, was 'too often overlooked', some experts said. Fats and oils were a major source of energy and an increased intake could restore the dietary balance of malnourished children. FAO officials said that 30 per cent of malnourished children in developing countries were suffering from a combination of lack of energy-producing and protein foods. The other 70 per cent suffered from lack of energy alone, which they could find mainly in fats and oils.

In developed countries, on the other hand, there was the danger to human health in an excessive intake of some types of fats. The experts noted that there was especially an adverse effect on cardio-vascular systems.

It was reported at the meeting that experiments with animals indicated that erucic acid in rape seed oil and long chain fatty acids in partially hydrogenated marine oil may have adverse effects on heart muscles, although at this time there was no clear evidence that this applies also to humans. The experts, however, recommended for population groups living on a diet with high fat content the use of these oils mixed or blended with other oils. This may be of special importance in the case of children, they said.

Nineteen nutrition experts from 13 countries took part in the consultation.

Publication for Business Houses

The United Nations has launched the first edition of a Business Edition of Development Forum which will publish fortnightly 'general procurement notices' of the World Bank and the UN Development Programme (UNDP), the two leading United Nations Organizations in the development field.

Development Forum, which is a free UN monthly newspaper on key issues in the economic and social aims and achievements of the UN system, is now entering its sixth year. Its readership has grown steadily, its six-language edition has reached a total press run of over 100,000 copies and it is read in 170 countries and territories.

The Business Edition will be available initially for an annual subscription of US $150. It will be the first publication to render service both to the business community and to the cause of international

development by promoting a flow of information benefiting buyers and sellers.

The procurement information, which the Business Edition will publish, will be obtained by the World Bank and UNDP direct from governments and project authorities and it will provide them on a more timely basis and in the greater technical details needed by suppliers and contractors than has ever been done before.

Interested firms and persons should write for a prospectus to: Development Forum (Business Edition), Subscriptions Department, United Nations, CH-1211, Geneva 10, Switzerland.

UNIDO

Industrial Development Board (IDB)

The Industrial Development Board (IDB) in a series of decisions covering finance, technology, Industrial Co-operation related to acceleration of the industrial progress in the Developing World has set down policies that will guide UNIDO for the next two years as per details:

The Secretary-General will arrange the first pledging conference for the Industrial Development Fund this year and inform governments that a desirable funding level would be $50 million. Group D (the socialist countries), though not opposing the Fund, abstained from the agreement for procedural reasons.

(*a*) International co-operation in the transfer of technology directed at developed and developing countries and at UNIDO and other international organizations.

(*b*) UNIDO will arrange two consultations this year on the state of leather and leather-products industry and of the vegetable oils and fats industry throughout the world.

(*c*) The Third General Conference of UNIDO will be held for three weeks in September/October 1979. An invitation from the Government of India offering New Delhi as the venue was accepted.

(*d*) An Industrial and Technological Information Bank, to be launched with a pilot scheme.

The Board was led by the mandate of the Second General Conference of UNIDO in 1975, and especially by the recommendation to raise productive capacity in the developing countries to 25 per cent of the world total by the end of the century.

The Board examined the activities of UNIDO during 1976, based on a report by the Executive Director which indicated that

Despite money and staff shortages, the level of technical assistance was maintained;

More than 2,000 projects were undertaken;

8,000 nationals of developing countries were trained;

UNIDO experts carried out more than 1,000 missions in 118 countries;

Studies were published on topics of global, regional and sectional interest and on the investment situation in 50 countries.

The Board considered a programme budget which will eventually be part of the whole United Nations budget and which covers UNIDO administrative, research and industrial operations. The $60,214,600 proposed for 1978-1979 is $14 million more than the figure for the biennium 1976-1977, but in terms of real growth it is an increase of 3 per cent.

The Board accepted applications for association with UNIDO from two intergovernmental organizations: the Arab Fund for Economic and Social Development and

the Inter-Arab Investment Guarantee Corporation. In addition, five non-governmental organizations were granted consultative status. They were the European Centre for International Co-operation (CECI); the International Centre for Industry and the Environment (ICIE); the International Federation of Inventors Associations (IFIA); the International Federation of Pharmaceutical Manufacturers Associations (IFPMA); and the World Peace Council (WPC).

The IDB's subsidiary Permanent Committee will hold its ninth session from 5-9 December 1977 and its tenth from 2-12 May 1978. The twelfth session of the IDB is scheduled for 16-26 May 1978.

Pilot information bank (INTIB): The Industrial Development Board has approved the establishment of an Industrial and Technological Information Bank (IN TIB), to begin with a pilot project that will complement existing information and advisory services covering specific industrial sectors.

'The criteria for selecting the sectors take into account their different characteristics with respect to complexity, investment requirements, scale of production, technological inputs, employment potential, human skill requirements, infrastructure and impact on the national economy'.

At first, the project will collect in-house information, negotiate with international sources and develop co-operative programmes with other United Nations agencies and intergovernmental organizations so as to establish a network of information sources, prepare technological information profiles and disseminate information.

During this first phase the Bank will not be able to serve individuals or specific firms. It will confine itself to selected institutions in developing countries, including ministries of industry, planning and industrial development; multipurpose technological institutions; transfer of technology institutions; and registries.

The Bank's main activity will be the selective processing of technological information, 'thereby providing the developing countries with a basis for making decisions'. The Bank will not duplicate existing services of limit itself to the normal documentation or abstracting work.

Dr Abd-El Rahman Khane, Executive Director of UNIDO, and Dankoulodo Dan Dicko, Secretary-General of the Agence de co-operation culturelle et technique (ACCT), signed an agreement on facilitating and harmonizing the efforts of the two organizations to promote the industrialization of the developing world.

The agreement sets out formal working arrangements between UNIDO and ACCT.

ACCT, which has consultative status with UNIDO, is an intergovernmental organization with headquarters in Paris. Its members are Belgium, Benin, Burundi, Canada, Central African Empire, Chad, Comoros, France, Gabon, Haiti, Ivory Coast, Lao People's Democratic Republic, Lebanon, Luxemburg, Madagascar, Mali, Mauritius, Monaco, Niger, Rwanda, Senegal, Seychelles, Togo, Tunisia, United Republic of Cameroon, Upper Volta, Socialist Republic of Viet Nam and Zaire.

The activities of ACCT are based on the idea of horizontal co-operation among all member countries. Emphasis is on the creation and development of medium- and small-scale enterprises that make the best use of indigenous products, particularly those related to forests, cattle, agriculture and fisheries.

Industrial Problems

More than 20 representatives of Afro-Asian Chambers of Commerce assembled in Budapest last month to identify industrial services needed in the 16 participating developing countries and examine ways

and means of putting these services into practice.

Sponsored by the United Industrial Development Organization (UNIDO), in co-operation with the Hungarian Chambers of Commerce, this meeting reviewed the organisational, financial and operational systems of the Chamber of Commerce in their countries and study ways to help overcome problems facing them in their drive for rapid industrialization.

India was among the 16 countries whose Chambers of Commerce and Industry were represented in the forum.

Among the subjects discussed at this meeting were analysis of industrial sectors and their priorities given in the development plans; identification of new industrial institutions which could be developed to provide industry with services needed; and examination of possibilities for greater co-operation and technical assistance.

U.S.A.

Food Safety and Quality Service

The USDA has established a Food Safety and Quality Service whose responsibilities include those functions formerly assigned to the Animal and Plant Health Inspection Service and the Agricultural Marketing Service relating to inspection, grading, and standardization of meat and poultry products, eggs, dairy products, and fresh and processed fruit and vegetable products.

The FDA is proposing to ban the use of saccharin in formulated foods, including soft drinks, in cosmetics that are likely to be ingested, in animal drugs and feeds, and as a tabletop non-nutritive sweetener, because it has been shown to cause cancer in laboratory animals. The Delaney clause does not apply to human drugs and therefore does not prohibit the approval of a drug that has been shown to cause cancer in laboratory animals if the drug provides medical benefits that outweigh the potential risk. The FDA is proposing to accept and promptly review new drug applications for the marketing of saccharin as a single-ingredient drug available without a physician's prescription. Such products would have to be labelled with a conspicuous warning about the risk of cancer. The new drug applications must be accompanied by legally acceptable evidence of the effectiveness of saccharin for its labelled indications.

The Canadian Department of Health and Welfare has granted Canadian food manufacturers a short-term extension to allow the sale of soft drinks, beverage mixes, and beverage bases containing saccharin until Oct. 1, 1977 and of other foods containing saccharin until Dec. 31, 1977. Saccharin may also be sold outside of pharmacies for use as a tabletop sweetener until Feb. 1, 1978, but after that date it will be available only in pharmacies as a non-prescription drug for diabetics and others who must restrict their intake of sugar.

The FDA is requiring a warning statement on the label of foods, cosmetics, and other products packaged in self-pressurized containers using fully halogenated chlorofluoroalkanes (chlorofluorocarbons) as a propellant. Specific exemptions include the use of a chlorofluorocarbon propellant is essential. The Warning statement, 'Warning—Contains a chlorofluorocarbon that may harm the public health and environment by reducing ozone in the upper atmosphere', must appear on all appropriate products shipped in interstate commerce on or after Oct. 31, 1977. The Consumer Product Safety Commission is requiring a similar statement on products under its jurisdiction.

The USDA's Food Safety and Quality Service is requesting comments on the most appropriate means of accomplishing a voluntary conversion to the use of the metric system in the labelling of meat and poultry

products. Specific approaches might be to: (1) require English system weights and measures and permit voluntary use of metric weights and measures as well, (2) require use of both systems at the same time (dual labelling), or (3) allow individual companies to use English, metric, or English metric.

The FDA has slightly modified its vitamin and mineral regulations to state in general terms that vitamin and mineral preparations newly authorized by Congress for which particular names have not been established by regulation must be labelled with 'an appropriate descriptive term'.

Minimum Wage

The American Federation of Labour and Congress of Industrial Organizations (AFL-CIO) welcomed President Carter's support for 'a significant improvement in the minimum wage' and called on Congress 'to move quickly to translate this agreement into legislation'.

A compromise agreed to by the White House is a substantial advance over the $2.50 an hour pay proposal. It would bring the minimum wage above the poverty level and keep it there.

AFL-CIO President said labour was proud to have been part of an effort by the Coalition for a Fair Minimum Wage to persuade the Administration that its initial proposal was inadequate. This would raise the present $ 2.30 wage floor to $ 2.65 in January 1978.

The minimum would advance in two annual steps to a permanent level of 53 per cent of the average straight-time factory wages. Automatic adjustments each year would maintain the ratio.

While the 53 per cent 'indexing' level isn't as high as the AFL-CIO had sought, it is an important step in assisting low-wage workers to maintain their relative standing in the workforce.

The agreed-on $ 2.65 first step of the compromise is approximately 51 per cent of the present factory wage.

The second-year step calls for 52 per cent of factory pay, and the 53 per cent link would be achieved the following year. Each January adjustment would be based on the average straight-time factory wage for a 12-month period ending the previous June.

The minimum wage is likely to rise to about $ 2.89 an hour on Jan. 1, 1979, and to $ 3.15 an hour a year later.

CANADA

International Development Research Centre

The International Development Research Centre (IDRC) is a public corporation established in 1970 to stimulate and fund research in developing countries, adapting science and technology to meet the challenges of development. Special emphasis is given to the problems of rural areas.

IDRC believes that research constitutes a major catalyst to development and change in science and technology. Developing countries have had little involvement in research and have received a correspondingly small share of the benefits associated with it, not only in terms of goods and processes, but also of trained manpower. IDRC hopes to help correct this imbalance.

One of the main goals of the Centre is to help developing regions to build up their own research capabilities and the innovative skills needed to solve their problems. The developing country researchers are responsible for identifying, designing, and carrying out the research itself, with funds provided by the Centre. The Centre also emphasises the co-ordination of research between the

developing country researchers and institutions in Canada and in other developed nations.

A research project proposal from a developing country is considered in the light of the following criteria:

(*a*) The proposal should fit into a priority expressed by a government or research institute in a developing country.

(*b*) The research findings should have useful application over a region and in countries beyond the one in which the research takes place.

(*c*) The research will help close gaps in living standards inside those countries and lessen the imbalance in development between rural and urban areas.

(*d*) It will make the fullest possible use of local resources and research workers from the region.

(*e*) It will result in better trained and more experienced researchers.

The Agriculture, Food and Nutrition Sciences Division is one of five program divisions; the others are Health Sciences; Social Sciences and Human Resources; Information Sciences; and Publicaions.

Centre's Board of Governors agreed that high priority would be given to the food and subsistence needs of people in the rural areas of the developing world, particularly those living in the semi-arid tropics. The emphasis is on the work of the Agricutlture, Food and Nutrition Sciences (AFNS) Division that is reflected in the proportion of Centre funds disbursed for projects through the Division.

All program officers are based in the field, at the Centre's regional offices in Bogota, Cairo, Dakar, Nairobi, and Singapore. The staff are able to keep in direct contact with the needs of the developing countries in addition to maintaining an active professional involvement in their own field of specialization.

The Division's program of work and budget are organized according to conventional disciplines into five programs—Crop Sciences and Cropping Systems; Animal Sciences; Fisheries; Forestry; and Food Science and Nutrition (which might better be termed post-production systems research) with an associate director for each.

IDRC is a member of the Consultative Group on International Agricultural Research (CGIAR), which supports a network of international agricultural research centres (IARCs) each of which is dedicated to increasing food production in developing countries. The work of these IARCs is a central factor in the Division's activities. The Division contributes directly to the network through support for a number of individual projects being undertaken by the various centres, and less directly but more intensively through support for university, national, and regional research and training programs that are linked in one way or other to the work of the IARCs.

The Division assisted the Ford Foundation in creating the Institute for Crops Research in the Semi-Arid Tropics (ICRISAT), the first of a series of new IARCs sponsored by CGIAR. Subsequently IDRC was appointed by CGIAR as executing agency for the creation of the International Livestock Centre for Africa (ILCA) which now has its headquarters in Addis Ababa, Ethiopia, and for the establishment of the newest member of the family, the International Centre for Agricultural Research in Dry Areas (ICARDA), which will carry out research in crops and farming systems of importance to the Mediterranean, the Near East, and North Africa.

Although support for research projects proposed, defined, and executed by scientists in developing countries is the most

important component of the Division's program, a great deal of effort also goes into establishing and maintaining linkages among projects having a common or related goal. Division provides a technical advisor or network co-ordinator who helps to hold all the research pieces together and acts as a focal point for information exchange and technical advice and support.

The Division also provides a variety of supporting services and activities aimed at filling gaps in knowledge and rounding out the various research networks and projects into a more comprehensive whole. These activities include state-of-the art reviews, the sponsoring of international expert working groups to identify specific research needs, bringing together different international scientific bodies to tackle a common problem, and the provision of special consultants to IARCs, regional, and national programs.

The projects supported by the AFNS Division also benefit from the financial, legal, and administrative guidance the Centre is able to provide, and form the services of the other program divisions. Social Sciences and Human Resources makes possible pre- and post-project training programs, Information Sciences provides abstracting and other data retrieval services, and the Publications Division prepares, edits, and publishes project reports and other documents arising from projects and meetings.

U.K.

Development in Self-Adhesive Labelling

Two new labelling heads developed by Helix Hydro Ltd. of Slough, England, for their Helix-Aire self-adhesive-labelling systems extend the applications of the 'no contact' air-blast technique: in one case to vacuum-packing and similar lines that turn out products in several parallel channels; in the other, to the very-highest-speed canning and bottling lines currently being introduced, some of which call for labelling speeds approaching 2000 packs/minute.

Helix 'Polyply' heads can simultaneously label products travelling in any number of parallel channels, where formerly each channel needed a separate labelling machine. The self-adhesive labels, stripped in turn from a single backing-reel, are transported across the perforated face of a lightly evacuated airbox spanning the product lines until there is one label above each channel. They are then fired simultaneously onto the moving packs by a brief air-blast. Since no part of the labeller touches the packs, there is no risk of puncturing the vacuum seals. Placement accuracy is $\pm 1/32$ in (± 1 mm).

The transport system employs constantly moving endless belts to pick up each label as it is stripped and carry it across the airbox until protruding solenoid-actuated pins stop it. Sequencing controls bring the stops down in turn, starting with the furthest channel. The firing operation is then triggered from the product line, most commonly by photoelectric detection.

The development of Helix 'Abacus' heads increases labelling speeds by employing extra-wide backing reels with labels arranged in parallel tracks. A complete row of labels is fed onto the airbox at once, and the labels are then fired off singly onto the moving products, triggered by signals from the product line. With the machine's maximum stripping-speed of 1000 in (25000 mm) of web per minute effectively multiplied by the number of label-tracks, labelling speeds above 2000 packs/minute are readily achieved.

A special dispensing-unit with power-driven shaft will feed oversize reels up to 5 in (125 mm) in web-width and 18 in (460 mm) in diameter, carrying many

thousands of labels. Furthermore, reels can be changed with no stoppage of production. A tension-sensing mechanism signals when a reel is nearly finished, allowing the operator time to splice a new reel to the end of the old one.

The Polyply and Abacus principles can be combined in order to achieve higher labelling speeds on multi-channel lines. Moreover, either or both can be combined with Helix's recently introduced 'Gemini' head, which handles labels mounted on both sides of the backing-web—an important economy feature—stripping each complete side in turn. Labels may be butt-cut or die-cut. With all the heads, a high-speed computer-type printing module can print prices, codes or weights onto labels immediately before stripping.

Further Information from:

Helix Hydro Ltd., 545 Ipswich Road, Slough, Berkshire SL1 4EN, England.

Waste Recycling

A £ 2 million waste recycling and disposal plant is being developed in Doncaster, Yorkshire, by the county council in conjunction with the government environmental department. The plant will be based on a low-energy, dry separation system developed in a government laboratory. The cost of operating the new plant should run approximately £ 1.83 per ton. Simple landfilling costs £ 1.25 per ton and incineration of waste costs £ 10 per ton.

The annual gross operating costs are estimated at £ 400,000. Sales of reclaimed material should bring in about £ 353,000.

It is projected that the plant should produce glass (12 per cent), metal (44 per cent), carbonized fuel pellets (35 per cent) and fiber (9 per cent).

The plant will be completed during the end of 1979 or early in 1980.

Association of Soft Drinks Manufacturers

The 14th annual conference of the national Association of Soft Drinks Manufacturers was held in May at the Heathlands Hotel, Bournemouth. The Mayor of Bournemouth, Mr A. W. Patton, presided over the inaugural session. The Mayor commended the services of the Soft Drinks Industry and emphasised the need to maintain quality control. Mr Dick Stothert, the President of the Association expressed the hope that though the discussions may get heated at times there is plenty of goodwill, commonsense and cool air all around for a meaningful dialogue.

At the business session there were interesting discussions on 'The rise of the professional consumer'; 'towards better communications reaching the professional consumer'; 'Soft Drinks Standards in the U.K. and EEC'. There were a number of topics both at the general and business sessions and as a climax Association gave a Soft Drinks Trade Banquet and Ball.

HOLLAND

Tech-transfair 1978

The Royal Netherlands Industries Fair will be held as International Fair for technology-transfer from 8-12 May 1978 at Utrecht-Holland. Transfer of technology has been expanding and has become an important factor in the international movement of capital and trade. This expansion has been possible due to growth and diversification of production in all spheres and the tremendous increase in research and developments. Transfer of technology on a world-wide scale is possible through licensing agreement, joint ventures and these have become essential for the development of our world today. Many are looking for outlets for their technology and many are finding it difficult to locate technology

suited for their individual needs. A central well organised exchange market would play a vital part in technology transfer. The present product orientated, specialised Fair and Exhibitions is one step towards meeting this need.

Tech-transfair will be held in co-operation with the licensing Executive Society-International Conference. Several licensing experts will gather from all over the world. This meeting will stimulate thought provoking discussions by leading personalities from the industrialised world. Manufacturers, research departments, universities, research institutions, governmental agencies will participate. The Fair will be attended by potential buyers and users of technology. For participation and other details contact:

M/s Royal Netherlands Industries Fair
Jaarbeursplein—Utrecht
The Netherlands.

SWITZERLAND

World Health Organization

The WHO have started a data-bank on food viruses and the incidence on public health of viruses transmitted by food. The reports published deal with the following subjects:

(*a*) characteristics of the viruses which could have an influence on their transmission;

(*b*) examples of viruses in food, proved by laboratory experiences or by the arrising on an infection focus in the population;

(*c*) other evidences of viruses in food;

(*d*) methods allowing to detect viruses in food;

(*e*) studies on stability or inactivation of viruses in food.

Each report is illustrated by informations coming from one or several international sources and prepared by a virologist.

This information service has started functioning and precise information on specific subjects can be given to the food controllers; to epidemiologists who are interested in illnesses whose departure would be food; to research workers and analysts in food hygiene and the responsables of research programs. In order to assure a very rapid and precise service the user will receive information-forms with questions who fit into the system.

These information-forms as well as any supplementary information concerning the program may be addressed to 'Service de la sante publique veterinaire, Division des maladies transmissibles, Organisation mondiale de la sante, 1211 Geneve 27, Switzerland.

DENMARK

Dansk Arbejde and Invention Centre

Denmark Review has been published since 1962, in order to present a wider audience with information about Danish industry, commerce and agriculture both in the form of products being marketed and development of more general interest. Inquiries be made to Danish diplomatic missions, or direct to the Royal Danish Ministry of Foreign Affairs. Denmark Review is published quarterly in English, German, French and Spanish.

There are over 110,000 entries in the product and company register which Dansk Arbejde (The National Association for Danish Enterprise) has built up during 30 years of activity to promote Danish products. When the organization was founded in 1908, Denmark was almost entirely agricultural. Dansk Arbejde has been there to help at practically all stages of the country's industrial growth.

The service is without charge to the inquirer, and the answers are given without favouring companies which are members of

the organization compared to those which are not Dansk Arbejde has contact with all levels of the Danish business community.

Another side of the organization's activities takes the form of assisting small and medium-sized companies to overcome their problems, particularly where exports are concerned. Guidance and help are provided.

Dansk Arbejde publishes a monthly Danish-language magazine, which extends the inquiry and contact service by including a column presenting new products from companies and another reporting direct business inquiries from firms seeking processes or products.

The organization is a voluntary one, financed by contributions from the companies which are its members. Another and more recent extension of activities is the creation of a large permanent exhibition centre 20 miles north of Copenhagen, where Danish companies display their goods. The centre also contains all necessary facilities, bank, telex, restaurant, conference rooms for on the spot negotiations, and also houses the organization's head office.

The average basement inventor is a man with an idea, but usually he has little knowledge of the legal problems involved in protecting his idea, or of marketing it.

This was the view which led the Danish Technological Institute in 1972 to form the Danish Invention Centre. It was to provided legal, technical and general advice to inventors, and give them a hard-headed by expert assessment of their ideas.

Similar assistance had been given at the Institute, for many years on an informal basis. But formalization of the idea was a deliberate encouragement, and something of a gamble as well, according to the Centre's leader, Bjorn Westphal Eriksen.

On the basis of results achieved since then, Westphal Eriksen and the Institute feel they can claim it has been a success, and in the light of experience the Centre's activities have been widened.

Originally intended for the amateur with the bright idea, the Centre has become a valuable aid to more professional inventors as well.

In other situations, the Centre has acted informally as a broker for established productions.

The bulk of the Centre's business is concerned with the individual inventors. In 1973-74, almost 1,000 inventions and ideas were submitted to the Centre from 800 individuals. During the period, these ideas led to 41 sales contracts, and 20 of the Centre's clients completed contracts for manufacture, or began their own production. More contracts came after the end of the year periods. Accumulated turnover arising from inventions, in which the Centre has assisted, cannot be accurately calculated, but a survey of 14 selected inventions showed a turnover which rose from a half million D. Kr. at the start of 1974 to D. Kr. 13 million only 18 months later. Over the same period, the accounts at the Centre have shown a gradually narrowing gap between expenditure and revenue, and a steady increase in the Centre's income from the fees it charges, mainly on a percentage of royalty basis.

The fee is charged because the Centre, while idealistic in it basic concept, is intended to function as a hard-headed business operation. In return, the inventor can obtain qualified help in making industrial contracts and negotiating, in preparing patent applications and in finding economic backing if a viable product is to be made by its inventor.

FINLAND

Under Multilateral Trade Negotiations

Finland introduced Generalised System of Preferences in January 1972. Follow-

Tariff item number	Description of products	Rates of duty	MTN/CFFERS
07.01.904	Sweet capsicum, customs cleared in the period 1.11-31.3	IL 0.39 mk/kg.	Duty Free within GSP
08.01.202	Bananas (1.1-31.5)	IL 0.25 mk/kg.	—do—
207	,, ,,	IL 0.30 mk/kg.	—do—
209	Bananas, dried	IL 0.40 mk/kg.	—do—
08.02.300	Lemons	IL 0.07 mk/kg.	—do—
08.09.101	Water Melons	IL 0.26 mk/kg.	—do—
08.09.108	Melons, other	IL 1.45 mk/kg.	—do—
08.12.300	Dried apricots	IL 5 per cent	—do—
20.06.200	Pineapples	IL 22.5 per cent	Duty Free within GSP Elimination of import equalization tax 2/-.
ex 908/3/	Tropical fruits	IL 0.39 mk/kg	—do—
ex 900/3/	Tropical fruit-mixtures	IL 22.5 per cent	—do—
20.07.600	Pineapple Juice	IL 40 per cent	—do—
ex 20.07.803 3/	Tropical Fruit Juice	IL 40 per cent	—do—

ing the concessions made by Finland in the Multilateral Trade Negotiations within the Framework of the GATT, certain Tropical Products have been included in the GSP Scheme of Finland.

List presented by Finland in the MTN group of 'Tropical Products' is also reproduced.

Some additional items have also been suggested to the list of tropical fruits (annex II) (as given below).

Tropical fruits included in the Finnish GSP Scheme (CCN Heading 08, 07-08.12 and 20.04)	Fruits suggested to be further included in the above list
Mango	Banana
Guava	Pineapple
Papaya	Anona (cherimoya)
Cashew apple	Pomegranate
Tamarind	Kiwi
Avocado	Jackfruit (*Artocarpus integrifolia*)
Mangosteen	Persimmon
Lychee	
Ginger	
Fig	
Angelica	
Passion fruit	

Abolition of Import Equalization Tax

Government of Finland have abolished import equalization tax on products falling under those CCCN headings within chapters 1-24 which are included in the Finnish GSP Scheme with effect from 1st March 1977. This concession will be applied solely to imports from countries that are beneficiaries of the Finnish GSP Scheme including India. A list of the products is reproduced.

List of agricultural products (CCCN 1-24) included in the Finnish GSP Scheme on which the import equalization tax (IET) have been abolished with effect from 1st March 1977.

CCCN *Heading*	*Products*
11.04	Flours of the fruits falling within any heading in Chapter 8.
18.03	Cocoa paste, cocoa butter, cocoa powder.
18.05	(unsweetened)
ex20.01	Mango chutney, olives and capers prepared by vinegar.
ex20.01	Olives, tomato pulp and paste, otherwise prepared.
ex20.04	Tropical fruit and parts thereof, preserved by sugar.
ex20.06	Fruit otherwise prepared or preserved, whether or not containing added sugar or spirit.
21.01	Roasted chicory and other roasted coffee substitutes; extracts, essences and concentrates.
21.03	Mustard flour and prepared mustard.
21.04	Sauces, mixed condiments and mixed seasonings.
ex21.05	Soups and broths in liquid, solid or powder form; homogenized composite food preparations, not containing meat or meat offal.
22.01	Vinegar and substitutes for vinegar.

WEST GERMANY

Transport 78

A specialised international trade fair titled '*Transport* 78—Goods and Passenger Transport Systems—Today and tomorrow —International Trade Fair with Meetings and Discussions'—will be held from 17-21 October 1978, at Munich, West Germany.

The trade fair offers opportunity for both direct participation, or of holding the Annual General Meeting of any interested party—in Munich during the course of Transport 78. The organisers will offer the conference facilities of the Trade Fair Grounds, or alternatively, those provided by Munich's hotels, as well as their assistance in the preparations.

In order to ensure the optimum provisions for active participation—whether it be as direct participant, as exhibitor or in the conferences and seminars—they would be grateful for an early response from those interested. For further details please contact:

Munchener Messe-UND
Ausstellungs gesellschhaft MBH
Transport 78
Postfach 12 10 09
D-8000 Munchen 12

PORTUGAL

Import Surcharge

The import surcharges in Portugal, which were due to expire on March 31, 1977, have been extended.

Following are the rates of surcharges presently in force:

Thirty per cent for a list of over 600 tariff positions covering primarily consumer goods and materials used for production of consumer goods;

Thirty per cent for a list of almost 300 tariff positions covering largely non-essential consumer goods;

Sixty per cent for a list of over 60 tariff positions covering items considered non-essential, goods produced locally or goods for which acceptable local substitutes are available.

SPAIN

Import Surcharge

The surcharge of 20 per cent on imports into Spain, introduced on October 11, 1976, and which was scheduled to expire on April 11, 1977, has been extended for additional six months. Most imports were subject to the surcharge, calculated on the customs duties for the items concerned. Exempt from the surcharge are imports of capital goods and certain food items.

URUGUAY

Import Surcharge

Import surcharges have been reduced by Uruguay while previous surcharges ranging from 10 per cent to 55 per cent remained unchanged. The new surcharges have been reduced as indicated below:

Previous Surcharge	New Surcharge
%	%
10	No Change
30	,,
40	,,
55	,,
75	60
120	90
150	110
200	150

The surcharges are to be paid when the importer presents his import declaration to Banco del Uruguay.

The additional customs surcharge was raised from seven per cent to 10 per cent. This surcharge is payable three days after importer has filed his import declaration and is applicable to all imports. Surcharges are normally calculated on CIF value of the shipment.

CHILE

Protein Concentrate from Fish

The Instituto de Investigaciones Technologicas (Avenida Santa Maria 06500, Santiago, Chile) has developed and is offering a technology for preparing a soluble protein concentrate from lean fish and for using it in the formulation of milk substitutes and other foods for human consumption.

The technology involves the following stages:

(*a*) a tasteless, odourless protein is prepared from fish meat, using a modified and improved fish-paste process which includes an aqueous extraction stage;

(*b*) the purified protein is made soluble by enzyme action controlled according to the functional properties required of the final product; and

(*c*) the concentrate is either spray-dried or used in formulas with other ingredients to produce milk substitutes, baby foods, baby milk, dietetic foods and then spray-dried.

The technology will be of particular interest to countries where animal protein is lacking in diets but opportunities exist for developing a relatively low-cost fishing industry.

KUWAIT

Labelling of Foodstuffs

Article 6 of AMIRI decree published in Official Gazette No. 1145 of 3rd July 1977. A label in Arabic should be affixed on canned, bottled or pre-packed foodstuffs, containing, in addition to their commercial description, an explanation of their ingredients, properties, date of manufacture and expiry date in the case of foodstuffs with defined validity dated.

No label should contain any statements contrary to their specifications or actual contents.

The decree stipulated enforcement as from 1st August 1977. A special 'municipal' order is promulgated to confirm that a minimum of six months grace from the 3rd July 1977 date is to be granted.

U.A.E.

Banking Crisis

Speculative borrowing and overlending have precipitated a banking crisis in the United Arab Emirates. As a result of this crisis, and its impact on the public confidence, the UAE Currency Board has announced the following measures:

(*i*) No new bank will be given licence for operation in the UAE and the existing banks, local or foreign, will not be permitted to open new branches. This will not, however, affect the permission already given for opening new branches.

(*ii*) The cash reserve requirement in the form of Dirham deposit with the UAE Currency Board is raised from five per cent to 7.5 per cent from July 1, 1977. Banks will be paid interest at the rate of four per cent on this additional deposit.

(*iii*) The ratio of public deposits to bank advances has been fixed and now advances must be on par with the deposits. At a later date the ratio of advances to lending will be 70:100. For additional lending, banks must bring in extra capital and advances up to 15 times the amount of the extra capital will be allowed.

(*iv*) Banks will not be permitted to borrow or refinance from the UAE Currency Board.

(*v*) All financial institutions, and not merely banks, will now come under the direct supervision and control of the UAE Currency Board. The Board will also have the power to inspect the banks' books to satisfy itself about the observance of these regulations.

The purpose of these regulations is to restore public confidence in the working of the banking system, restrict bank borrowings and in effect bring about a credit squeeze in view of the high rate of inflation and rapid increase in bank advances. These measures are likely to have a considerable effect on the market, and may result in a slow-down in the opening of L/Cs for items like steel and foodstuffs, and have a perceptible impact on bank advances for construction purposes.

YEMEN

Transfer of Cargo from Ship to Shore

Hodeidah Port in Yemen, which is badly beset by congestion problems, will be the first to experiment with a new method to beat shipping congestion and the high capital cost of port installations. The Skyhook Balloon is the central point of this new scheme.

The Skyhook Balloon Transportation System, consisting of a helium filled balloon, winched systems, guyed mast, cables, lines, docks and anchors, has been developed by Lightspeed USA, Inc., and freight forwarders Unsworth and Co. of New York. The first Skyhook Balloon, christened Queen of Sheba, can lift up to 10 tons of cargo at once, and deliver to shore within two minutes. It is believed that the system can operate over distances of up to one mile in weather conditions worse than the limit for conventional piers.

With an operating cost of $23 per freight ton and an unloading rate of 800 tons per day, the designers compare this with an estimated average time and money investment in pier construction of three or four years and $10 m per pier, with operating cost of about $ 6 per freight ton. Helicopters and barges are also being examined as alternative solutions to port congestion but these carry higher operating and initial costs, and disadvantages such as double handling of cargo on barges. The Skyhook can run 22 hours a day, seven days a week with no supporting energy or water sources required, functioning without helium replacement for six to nine month periods.

JAPAN

International Congress of Food Science and Technology

The Fifth International Congress of Food Science and Technology, sponsored by the International Union of Food Science and Technology (IUFoST), will be held at the Kyoto International Conference Hall in Kyoto, Japan, from 17 to 22 September 1978. The preceding congresses took place in London (1962), Warsaw (1966), Washington, D.C. (1970) and Madrid (1974). During the Madrid Congress, Japan was designated as the host country for the 1978 Congress.

The host organization of the 1978 Kyoto Congress is the Union of International Food Science and Technology of Japan, the adhering body to IUFoST and the national inter-society committee representing: Institute of Food Technologists—Japan Section, Japanese Society of Food Science and Technology, Agricultural Chemical Society of Japan, Japanese Society of Food and Nutrition and Food Hygienic Society of Japan. The Science Council of Japan and the Japan Association for the Promotion of Science will support the Congress in association with IUFoST.

The 1978 Kyoto Congress will be designed:

- to promote international exchange of ideas and experience in those scientific disciplines and technology relating to the production, processing, distribution, conservation and utilisation of food, and related concerns.
- to encompass and call public attention to major progress made in the field of food science and technology since the previous congress.
- to provide opportunity to meet exchange ideas, obtain stimulation for future work and increase world-wide collaboration on topics of great importance.

Scientific Program

The program of the 1978 Kyoto Congress will encompass plenary sessions and working sessions. The plenary sessions will be dedicated to comprehensive assessment of the present and future role of food science and technology in solving world food problems. Internationally recognised authorities will address the plenary sessions in contexts to this most urgent matter facing humanity. In preparation for working sessions, a limited number of concurrent sub-plenary sessions, i.e., symposia, will deal with topics relating to the production, processing, distribution, conservation and utilisation of food for adequate nutrition, and related concerns including basic problems in these domains.

Contribution of papers on every aspect of food and related areas will be welcome to the working sessions. The contributed papers will be selected and classified as regards relevance to the program and variety of subject matters. Tne accepted papers will be allotted either for oral presentation at the regular sessions or for discussion at the discussion sessions—on condition that authors can attend the Congress session and defend their papers.

Unstructured meetings: The 1978 Kyoto Congress will provide abundant opportunities for the participants to have unstructured meetings: discussions, interaction with speakers, film shows and other types of exchange of ideas, planning for co-ordinated, collaborative research, etc.

Languages: Japanese and English will be the official languages at the Congress sessions. Simultaneous translation will be provided in these languages. English will be used in all printed materials except for those of local use.

Proceedings: The Congress Proceedings will be published after the 1978 Kyoto Congress. Subscriptions for the Proceedings will be received during the Congress period.

Exhibition

In conjunction with the 1978 Kyoto Congress a major exposition on an international scale of materials, processes, products, etc. will be arranged. It is also planned to attract the latest technical equipment and apparatus in the food industry, scientific instrumentation, books and periodicals related to food science and technology.

Social and Ladies' Programs

Family members accompanying the participants to Kyoto may register for the specially scheduled program for ladies. An interesting social program will be proposed for the Congress participants. The program, except for the Congress Banquet and other optional programs if any are planned, will be included in the registration fees.

Participation

The 1978 Kyoto Congress will be open to all food scientists and technologists and other professionals whose interests focus on the central theme of the Congress. Attendance to the Congress is expected to exceed 1,500 persons.

The Congress participation fee per participant will be as follows:

General Registration JPY	36000
Ladies Program JPY	9000
Congress Banquet JPY	9000

The General Registration fee covers admission to the Congress sessions and exhibitions; all congress materials (the Proceedings are not included); all social events, except for the optional programs; and the congress levy charged on behalf of IUFoST. The registration fee for the Ladies' Program includes the program activities planned for the family members as well as the non-optional social program of the Congress. A special allowance off the membership fees may be made to encourage student participation in the Congress.

NEPAL

ADB Loans

The Asian Development Bank (ADB) has approved a supplementary loan of $ 5 million from its Special Fund resources for Nepal to finance the foreign exchange component of a cost of overrun on the Chitwan Valley Development Project.

The project will provide year-round irrigation for about 11,000 hectares in the Chitwan Valley and is expected to lead to considerable increases in the production of paddy, corn, wheat, mustard, milk, eggs and meat.

The ADB has also approved another supplementary loan of $3.4 million to finance a cost overrun and an extension of the area to be irrigated under the Kankai Irrigation Project of Nepal.

Trade Marks

(Trade Marks accepted by the Trade Marks Registry)

Sl. No.	Name and Address	No. and Date of the Trade Marks Journal publishing the Trade Mark	Official No.	Date	Products	Trade Mark
	M/s					
1.	G. D. Nasikkar, 5, Bhivandi Nagar Palika Mandai Stall No. 4 Bhivandi	675/16.7.1977	280,433B	24.5.1972	Pickles	GDN Class 29
2.	Orient Pharma Private Ltd., Old Trunk Road Pallavaram Madras-600 043	675/16.7.1977	313,415	25.3.1976	Preserved, dried and cooked fruits	ORIENT
3.	Orient Pharma Pvt. Ltd., Old Trunk Road Pallavaram Madras-600 043	675/16.7.1977	313,416	25.3.1976	Food for human consumption excluding glucose; bread; biscuits (not for animals); cakes; pastry; and confectionery (non-medicated)	ORIENT Class 30
4.	Nestle's Products Ltd., C/o Depenning and Depenning, Alknanda, 16, Nepean Sea Road, Bombay-400 036	678/1.9.1977	292,491B	28.11.1973	Agricultural and horticultural products, meat, poultry, fish and alimentary products originating from the sea in the form of extracts, soups, jellies, pastes, preserves, ready-made dishes and frozen or dehydrated preserves, as well as in a crisp form; jams; eggs; milk, cheese and other food preparations having a base of milk, milk substitutes, edible oils and fats; mayonnaise	al 110 Class 29
5.	I.T.C. Limited Virginia House 37 Chowringhee Calcutta	679/16.9.1977	313,707	5.4.1976	Meat, fish, poultry and game; meat extracts; preserved, dried and cooked fruits; and vegetables, jellies, jams, eggs, milk and dairy products for food, edible oils and fats; preserves, pickles	INDOVILS Class 29

Sl. No.	Name and Address	No. and Date of the Trade Marks Journal publishing the Trade Mark	Official No.	Date	Products	Trade Mark
6.	Ramble Restaruant, Regal Park, Cannaught Place, New Delhi	679/16.9.1977	317,655	11.8.1976	Food preparations and cooked vegetables	RAMBLE Class 29
7.	Rakki Food Products, 40, Sekkizhar Street Chokkikulam Madurai-2	680/1.10.1977	312,535B	19.2.1976	Preserved, dried and cooked fruits and vegetables, jellies, jams and pickles	RAKKI Class 29
8.	Zaloom Brothers Co. Inc., 505, Lincoln Avenue Secaucus, New Jersey-07094 U.S.A.	680/1.10.1977	314,182B	21.4.1976	Seafood	MONSOON
9.	Kamila Tyabji B-12, Meherina Off Nepean Road Bombay-400 036	680/1.10.1977	317,828	19.8.1976	Jellies (for food), jams, preserves and pickles, all being goods	WIT Class 29

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BANGALORE 560002

Government Notifications

- *Central Excise—Pickles*
- *Export of Onions during 1977-78*
- *Refunds/Drawback Claims—Crediting the amount*
- *Facility for Imports Through Air India/Indian Airlines*
- *Customs and Central Excise Duties Drawback Rules*

Central Excise—Pickles

Trade Notice No. 72-CE/77 (1 P or P Foods) dt. 23.7.77, issued by the Central Excise Collectorate, Delhi, is reproduced below:

"Attention of the trade concerned is invited to the Govt. of India's Notification No. 17/70 dt. 1.3.70, published in Part II, Section 3, Sub-section (*i*) of the Gazette of India dt. 1.3.70.

2. In accordance with explanation (*iii*) below notification No. 17/70 dt. 1.3.70, 'Pickles' are not deemed to be P or P Foods under Central Excise Tariff Item IB.

3. A question has been raised whether 'Pickles' included both vegetable and non-vegetable pickles.

4. It has been decided that it would not be correct to exclude pickles of meat/pork/chickens from the exemption admissible to 'Pickles' mentioned in Notification No. 17/70, dt. 1.3.70, as 'Pickles' did not mean vegetable pickles only".

Export of Onions during 1977-78

An extract from the Export Instruction (No. 46/77 dated the 9th June 1977), issued by the Chief Controller of Imports and Exports, Government of India, Ministry of Commerce, New Delhi, is reproduced below for information of the trade:

Reference Export Instruction No. 31/77, dated the 13th April 1977*, on the above subject.

2. Export of Onions which was canalised through National Agricultural Co-operative Marketing Federation (NAFED) has been banned w.e.f. 13th May 1977, by the Ministry of Civil Supplies and Co-operation.

3. It has now been decided by the Ministry of Commerce to release a quota for export of Onions through NAFED only during 1977-78. This will also include the shipment, if any, made by NAFED, from 13th May 1977, onwards.

4. The entire ceiling has been placed at the disposal of the Jt. Chief Controller of Imports and Exports, Bombay, for the purposes of licensing. The applications received at other than Bombay ports may be considered after obtaining the ceiling from the Joint Chief Controller of Imports and Exports, Bombay.

Refunds/Drawback Claims—Crediting the amount

The public are hereby informed that all the Drawback/Refund claims, the amounts of which are to be credited in their deposit account, should invariably be accompanied by a credit slip at the time of filing of Drawback claims itself. The claims filed by the exporters/clearing agents without a credit slip will be paid by cheques as in the case of other claims, without any reference to the party; as their endorsement alone to credit the amount to deposit account cannot be treated as an authority in the absence of a requisite credit slip.

S. 12/15/77-Accts, Public Notice No. 63/77.

Facility for Imports Through Air India/ Indian Airlines

Attention is invited to the Ministry of Commerce Public Notice No. 33-ITC (PN)/76 dated the 30th April 1976, regarding the facility given for imports through Air India/Indian Airlines against REP licences and Actual Users licences issued for import of raw materials/components/spares and import licences for capital goods/HEP, issued against free foreign exchange (General Currency Area) only.

It has been decided that the aforesaid facilities for imports through Air India/ Indian Airlines as per the terms and conditions contained in the Ministry of Commerce Public Notice Nos. 61-ITC(PN)/75 dated the 4th July 1975, and No. 92-ITC(PN)/75 dated the 11th September 1975, will continue to be available upto 31st March 1978.

No. 9/6/75-EPC-Public Notice No. 25-ITC(PN)/77 of 17.5.77.

Customs and Central Excise Duties Drawback Rules

The Customs and Central Excise Duties Drawback Rules, 1971—Determination of brand rates under Rules 6 and 7—Submission of data by manufacturers and verification thereof—Procedure regarding.

I am directed to say that this Department has been experiencing difficulties in fixing drawback rates on the basis of data submitted by the manufacturers, since the firms do not furnish all the details required for fixation of the rates. The present statements prescribed do not appear to be adequate and more often the Department is forced to make avoidable references to the firms calling for additional data. This results in delay and sometimes denial of realistic drawback rates.

With the object of determining the correct drawback rates and within the shortest period possible, the Department has devised a new set of statements, given below for fixation of drawback rates. It is hoped that these statements will facilitate the fixation of fuller, correct and quicker settlement of drawback rates. The details called for in th enew statements should be easy to fill in by the manufacturers, since the details called for are within the reach and are part of the day-to-day activities. You are requested to give wide publicity to the new statements and inform all your constituent-members also. The Department proposes to introduce these new statements w.e.f. 1st June 1977. Till then the existing proforma and statements will continue to be used.

(No. 602/41/72-DBK dated 13th April 1977, from Ministry of Finance, Department of Revenue and Banking [Revenue Wing), New Delhi].

Men and Companies

- *Shri B. S. Sood*
- *Central Food Technological Research Institute (CFTRI)—Information Centre for Food Technology*
- *Association of Food Scientists and Technologists (India)*
- *All India Shippers' Council*
- *Tata Oil Mills Company Limited*
- *Naarden International N. V.*
- *Trade Development Authority*

Shri B. S. Sood

Shri B. S. Sood has joined as General Manager, Government Fruit Juice Bottling Plant, New Delhi, in the Department of Food, in July 1977.

Shri B. S. Sood was born on 22nd October 1923. He graduated from the Punjab University in the year 1944. He did post-graduate Advance Diploma Course in Fruit and Vegetable Technology at the Indian Institute of Fruit Technology, Lyallpur. Shri Sood worked as Chief Chemist-cum-Manager with a public limited company for about three years and thereafter started a partnership concern under the name of NABALI Food Industries in U.P. After winding up the partnership company, he worked for 8 months as Production Manager in the Fruit Preservation Section of Simbhaoli Sugar Mills Ltd., Simbhaoli. He was selected by the U.P.S.C. as Deputy Development Officer in the Ministry of Food and Agriculture and worked there in different capacities as Marketing Development Officer, and Deputy Senior Marketing Development Officer. In 1971, he took over as Deputy Director (F and VP) in the Department of Food, Bombay and worked there until end of June 1977. During this period, he made himself very popular with the manufacturers/exporters of fruit products and the other export agencies by rendering quick and efficient service. During his stay at Bombay, the export of fruit products showed a significant increase due to prompt and efficient service rendered by Shri Sood and the staff of the department. In present assignment, he is responsible for the completion of the plant, manufacturing and marketing of fruit juices.

Shri Sood was deputed by the Asian Productivity Organization, Japan, to study fruit preservation and canning in Food Processing Factories in Denmark, U.K., U.S.A., and Japan.

Central Food Technological Research Institute (CFTRI)—Information Centre for Food Technology

The Government of India, Department of Science and Technology, has approved the establishment of a Sectoral Information Centre for Food Technology at Central Food Technological Research Institute, Mysore, as part of the National Information System for Science and Technology (NISSAT). This Information Centre is being built around the infrastructural facilities already available at CFTRI and will be responsible for storage and distribution of food information on a nation-wide basis with special emphasis on small scale, village and cottage industries.

The CFTRI which was established in 1950 has grown to be an institution of international repute and has built up, over the years, a good library and documentation service. Realising the potential role it could play in the development of country's food industries, a plan for developing this library into a National Information Centre entitled Food Science and Technology

Information Service (FOSTIS) was drawn up in 1972. This plan was submitted to the Government and was included in the NISSAT plan which was an important feature of the Science and Technology plan.

The objectives of the proposed Information Centre are: to provide information service to institutions/individuals which are concerned with food science and technology with emphasis on the information requirements of small scale, village and cottage industries; to function as a clearing house for information on all aspect of food science and technology; and to collaborate in the integrated development of various documentation/information systems in food science and technology and related systems in the country as a whole, and function as a feeder to similar international system.

Among the various information services that are to be rendered by the Information Centre are: Specialised current indexing and abstracting services including selected dissemination of information (SDI) services; Subject bibliographies; Subject union catalogues; Information retrieval on request; Information on patents specifications, standards; Information on scientific, technical and economic data; Business and marketing information; Preparation of surveys, state-of-art reports, scientific and technological forecasting and other types of techno-economic and special management information services; Translation services; Reprography services; and Technical enquiry service.

The Information Centre will be organised into: Document acquisition and processing; Documentation/Information services and facilities; Promotion of information use in industry; and Reprography, printing and publications.

Association of Food Scientists and Technologists (India)

The Association of Food Scientists and Technologists (India) has proposed to organise the Convention of Food Scientists and Technologists to be held in May 1978 at the Central Food Technological Research Institute (CFTRI), Mysore. The Convention will have the participation assistance of other organisations like Council of Scientific and Industrial Research (CSIR); Department of Science and Technology; Department of Food, Ministry of Agriculture and Irrigation, Government of India; Indian National Science Academy (INSA), Defence Science Organisation (DSO), and other organisations.

The main object of the Convention is to provide opportunity for all the food scientists and technologists to come to a common forum for discussion, interaction and exchange of ideas. The papers in the technical programme will be helpful to update the knowledge and keep the members abreast of the current trends and technological developments in the country. Knowledge is also exchanged through impromptu gatherings of food professionals face to face in the Convention.

This Convention has taken up the general theme 'Science and Technology for changing food concepts', and discussions will be carried out simultaneously at parallel sessions covering wide range of topics. Following are the important topics included for discussion in the Convention:

(*a*) Basic Food Chemistry
(*b*) Flavour Chemistry
(*c*) Food Processing
(*d*) Food Safety and Toxicology
(*e*) Refrigerated and Frozen Foods
(*f*) Food Engineering
(*g*) New Food Product Developments
(*h*) Quality Control
(*i*) Microbial Processes for Producing Foods
(*j*) By-products from Food Plant Wastes
(*k*) Food Protection

(*l*) Food Additives

(*m*) Food Packaging

(*n*) Education and Training on Food Science and Technology.

The Research and Development efforts made and results achieved on the above areas will be discussed and areas where further Research and Development efforts required will be identified.

Papers for presentation on the above topics at the Convention are invited from all those interested in Food Science and Technology. The abstracts of the papers, typed in the prescribed form should reach the Honorary Executive Secretary on or before 31st December 1977. The full papers should reach the Honorary Executive Secretary, before 31st January 1978. All the papers submitted will be screened by a screening committee and the decision will be intimated to the authors. It is also proposed to bring out a souvenir where lead papers from eminent specialists in different areas of Food Science and Technology and the abstracts of the papers will be published.

For further information please write to:

The Honorary Executive Secretary

Association of Food Scientists and Technologists (India)

C/o Central Food Technological Research Institute, Mysore-570 013 (India).

All India Shippers' Council

The 10th Annual Meeting of the All India Shippers' Council was held on 13th August 1977 in Bombay. The shipping fleet has exceeded 5 million GRT and according to the figures available for 1976-77, the exports were Rs 5089 crores. The Indian lines have established regular services on all the major overseas trade routes such as U.K., Europe, U.S.A., Japan, Far East, and Australia. Indian lines are members of several important international conferences. A suggestion was made to the shippers to avail of the intimate knowledge of various markets before embarking on exports to new market in consultation with the shipping lines. In recent years there has been a growing understanding between the shippers and shipping lines in introducing promotional services and there is a constant need for mutual exchange of views which should include all aspects of conference work, type of vessels employed, terms and conditions of shipment, adequacy of shipping services, competition from non-conference lines and ports of call.

One of the issues that came up for reference at the meeting is the advance booking of cargo. While this helps in framing a proper plan for vessel scheduling, it may not be possible for small shippers all over the country to make firm commitments. The major shipping lines with their long experience in handling trade are better equipped with cargo, distribution frequency and accordingly they should plan their vessels. Another important aspect is that of freight rates. There is a frequent increase of freight rates. Some on the grounds of better turnround and cargo availability. There is a need for critical analysis of tariff of various shipping conferences.

The opening of Suez Canal in June 1975 improved the availability of vessels but the liner freight rates continued to rise on the ground of rise in cost of operation. Besides general level of freight rate the conferences impose various surcharges such as bunker, Suez transit, currency adjustment factor, port congestion etc. While these are of temporary phenomenon and are justified only on the basis of additional cost incurred by the shippers, these are not abolished or reduced when justified by the improvement in the situation, and in very many cases these concessions are delayed unduly.

There is a feeling that multiplicity of agencies engaged to cargo booking hampers

the smooth flow of exports and a view has been expressed by the centralised system of cargo booking to provide a solution.

The success of exports is largely depended upon the co-ordination and co-operation available between the cargo owners and cargo movers. There is a strong view for providing mechanical handling facility in our Indian ports especially high capacity cranes and heavy lifts and for reefer warehousing facility, deep draft berths, night pilotage and task force for provision of pilferage.

There was reference also for simplification of customs procedure and uniform rules and regulations for collection of port charges at all the major ports. There is a need for pelletisation and containerisation.

Tata Oil Mills Company Limited

The 59th Annual Report of Tata Oil Mills Company Limited has been published. The Company has shown profit of Rs 185.91 lakhs compared to 279.48 lakhs during previous year. The sale of soaps and detergents showed good progress and Food Products increased by 5 per cent. During the year, a new 501 detergent bar was introduced with encouraging result. The research and development division perfected a process of recycling spent catalyst and put on commercial exploitation. The Malaysian venture of Unitata introduced Lakshmi refined Palm oil which is similar to vanaspati at a lesser price in small consumer packs.

The Company's exports were 6.37 crores as compared to 2.40 crores the previous year showing an increase of 52 per cent. The reorganisation of the capital structure and the acquisition of Indian business on undertaking of James Finlay and Company Limited and their associated Tea companies, Tata Finlay, has become the largest and diversified tea growing operation in the field of Black Tea, packet tea and instant tea.

Naarden International N.V.

An agreement was signed at Naarden today between Shell Petroleum N.V. and Naarden International N.V. to set up a joint company in which both partners will participate for 50 per cent.

The new company—Naarden and Shell Aroma Chemicals B.V.—will, as has been mentioned earlier, concentrate on research, development, production and marketing of fragrance raw materials (aroma chemicals).

The agreement is the result of a joint study, which now shows that it is possible to produce a commercially attractive range of aroma chemicals based on petrochemical technology.

The joint venture will evolve in a number of phases. In a later stage this will lead, among other developments, to the construction of a plant for the manufacture of these products.

Aroma chemicals are mainly used in the production of fragrance compounds—essential ingredients for soaps, detergents, house-hold products, toiletries, cosmetics and fine perfumery.

Trade Development Authority

The Trade Development Authority of India, New Delhi, will organise Indian National Exhibition in Moscow from 1st to 31st August 1978. U.S.S.R. occupies an important place in Indian Foreign Trade and our exports have been increasing remarkably. Indo-U.S.S.R. trade is conducted in the frame work of a long term trade and payment agreement which provides for bilateral balance trade between the two countries. Indian Industry is also collaborating with U.S.S.R. in export contracts entered with the 3rd countries by U.S.S.R.

The Indian National Exhibition planned in Moscow will be held in the most prestigeous Arena using the permanent exhibi-

tion of economic achievements of U.S.S.R., which will be spread over an area of 15,000 sq. metres and will provide a significant exposition to modern India not only in U.S.S.R. but also East Europe in general. The display of a wide range of Indian Products is expected to generate a demand for a few items at present not included in the current trade balance. For participation and other details please write to The Trade Development Authority of India, Pragati Maidan, Lal Bahadur Shastri Marg, New Delhi-110 001.

Dairy Industry Conference—1978

Bangalore has been the key-centre for dairy development in the country and it is also the home of pioneer cross-breeding work. Fundamental research covering all aspects of the Dairy science from production to processing was done by scientists at the National Research Institute. The Indian Dairy Association will hold the XIV Indian Dairy Industry Conference in Bangalore from 18th to 20th January 1978. The Government of Karnataka and Karnataka Dairy Development Corporation have extended co-operation to this Conference.

The theme of the Conference is 'Approach to India's Dairy Development—Perspective 1985'.

About 600-700 delegates including overseas representatives will participate.

The deliberation of the Conference will be of considerable significance to dairy development in the country. The papers of the following subjects will be presented and discussed:

1. Farmers' organisation, production and procurement of milk.
2. Utilisation and marketing of milk suited to Indian economy, environment and tradition.
3. Institutional frame work and manpower requirement for growth envisaged by 1985.

Visits have been planned to:

1. Dairy Co-operative Societies of the Karnataka Dairy Development Corporation established under World Bank Project.
2. SRS of National Dairy Research Institute and Bangalore Dairy.
3. UAS and Indian Veterinary Research Institute, Hebbal.
4. Hessaraghatta Farm.

For details please contact:

Office of the Reception Committee
XIV Dairy Industry Conference
The Karnataka Dairy Development Corporation Ltd.
Poornima Building,
No. 22 J. C. Road-I Cross
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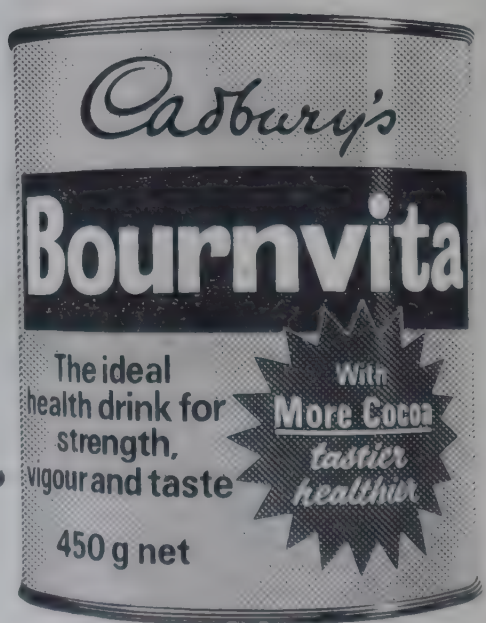

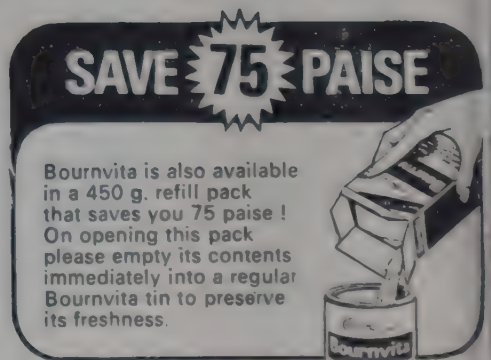

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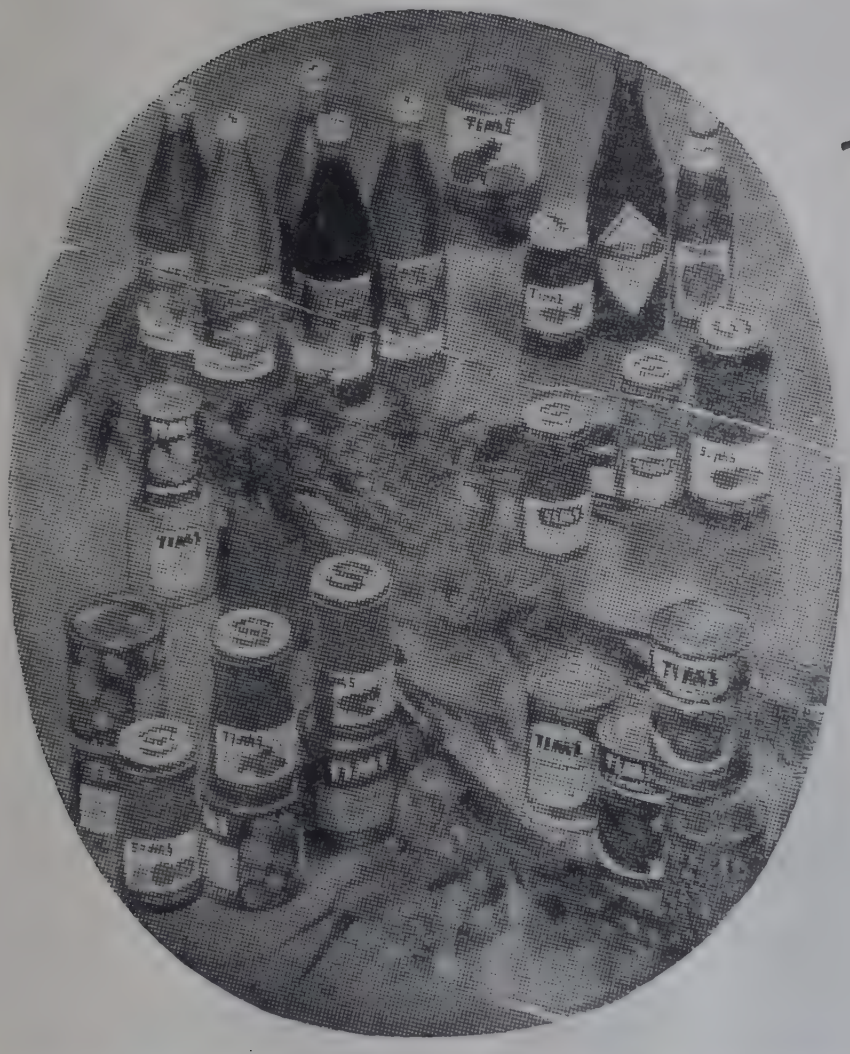

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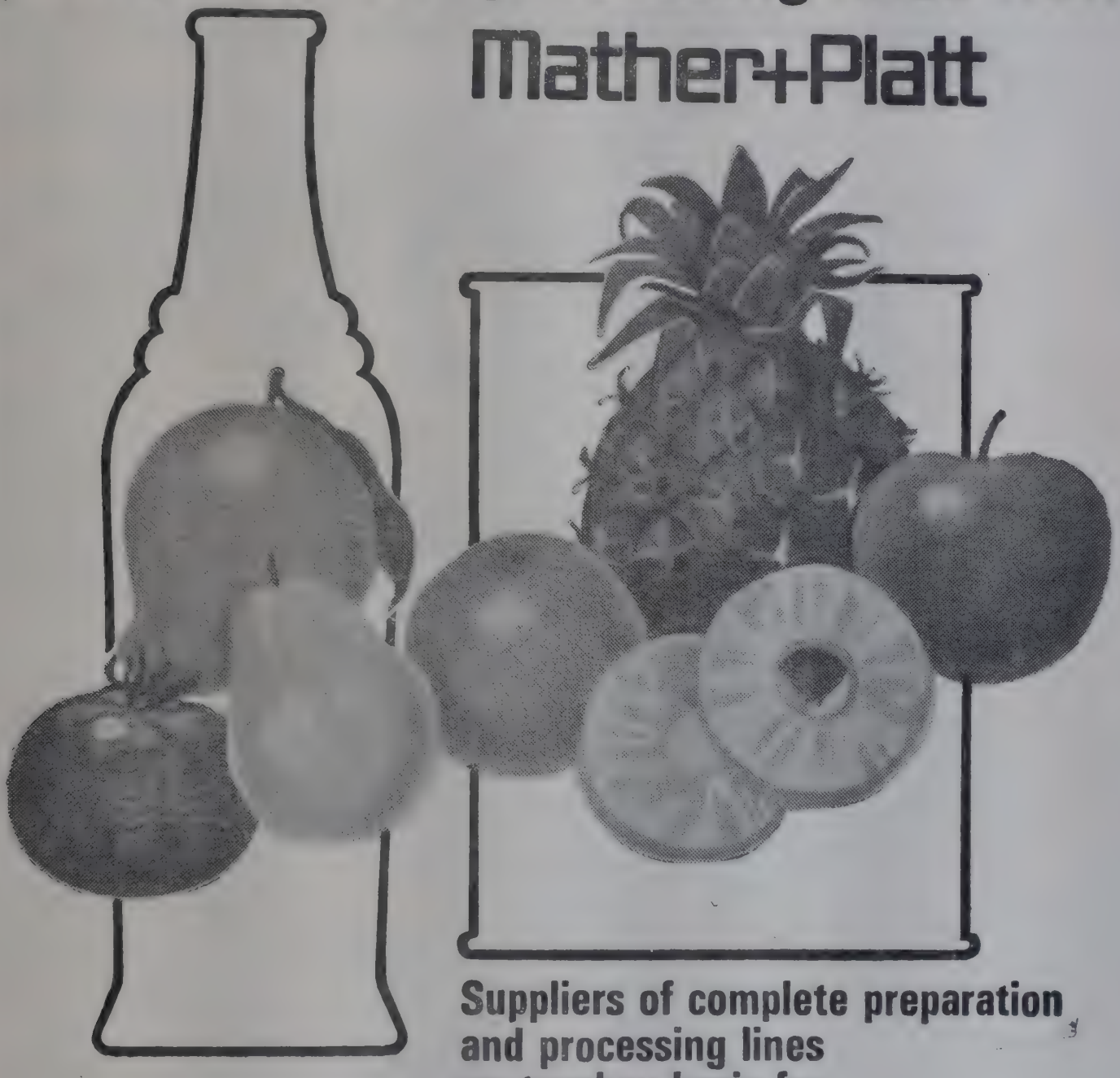

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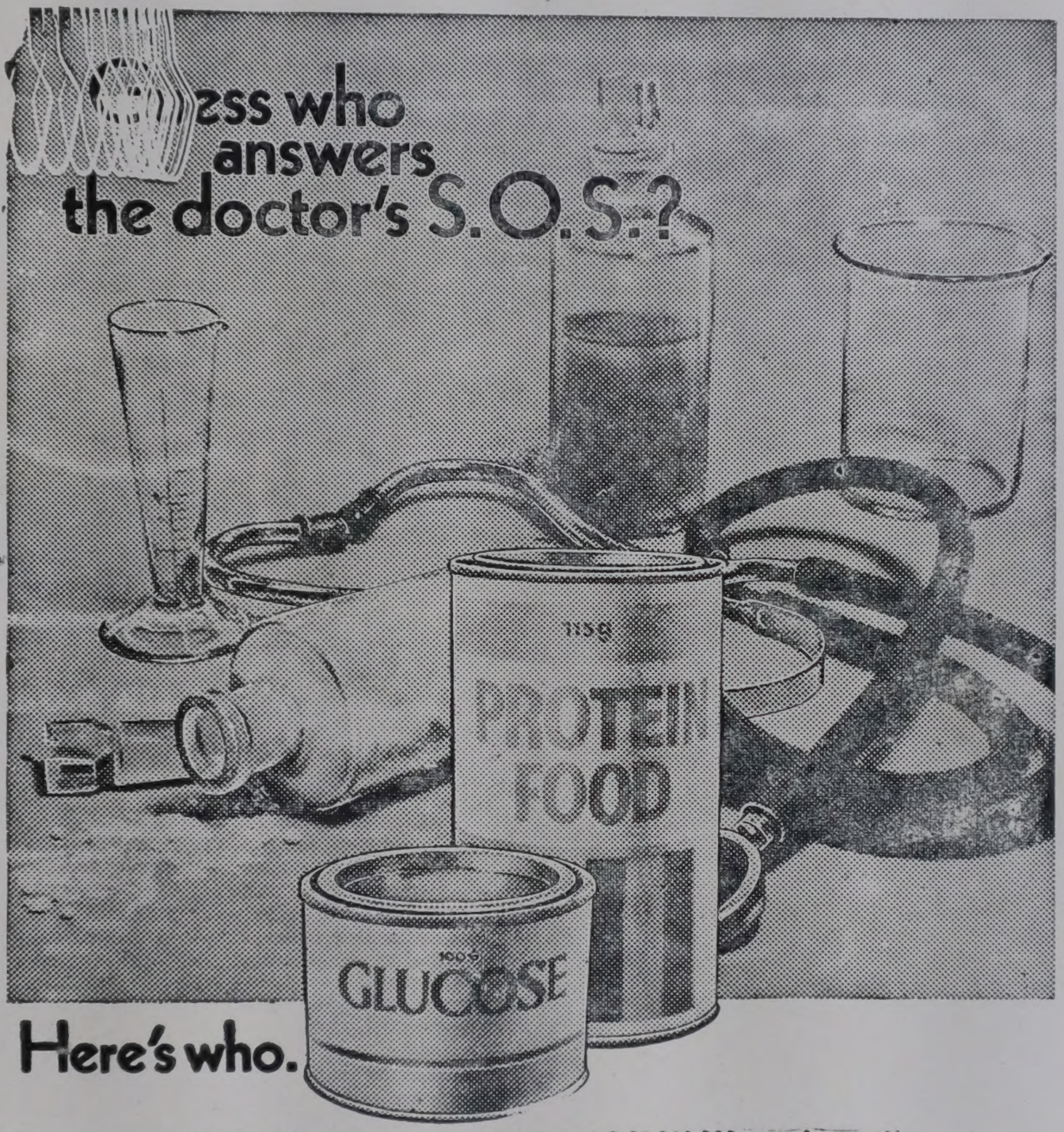

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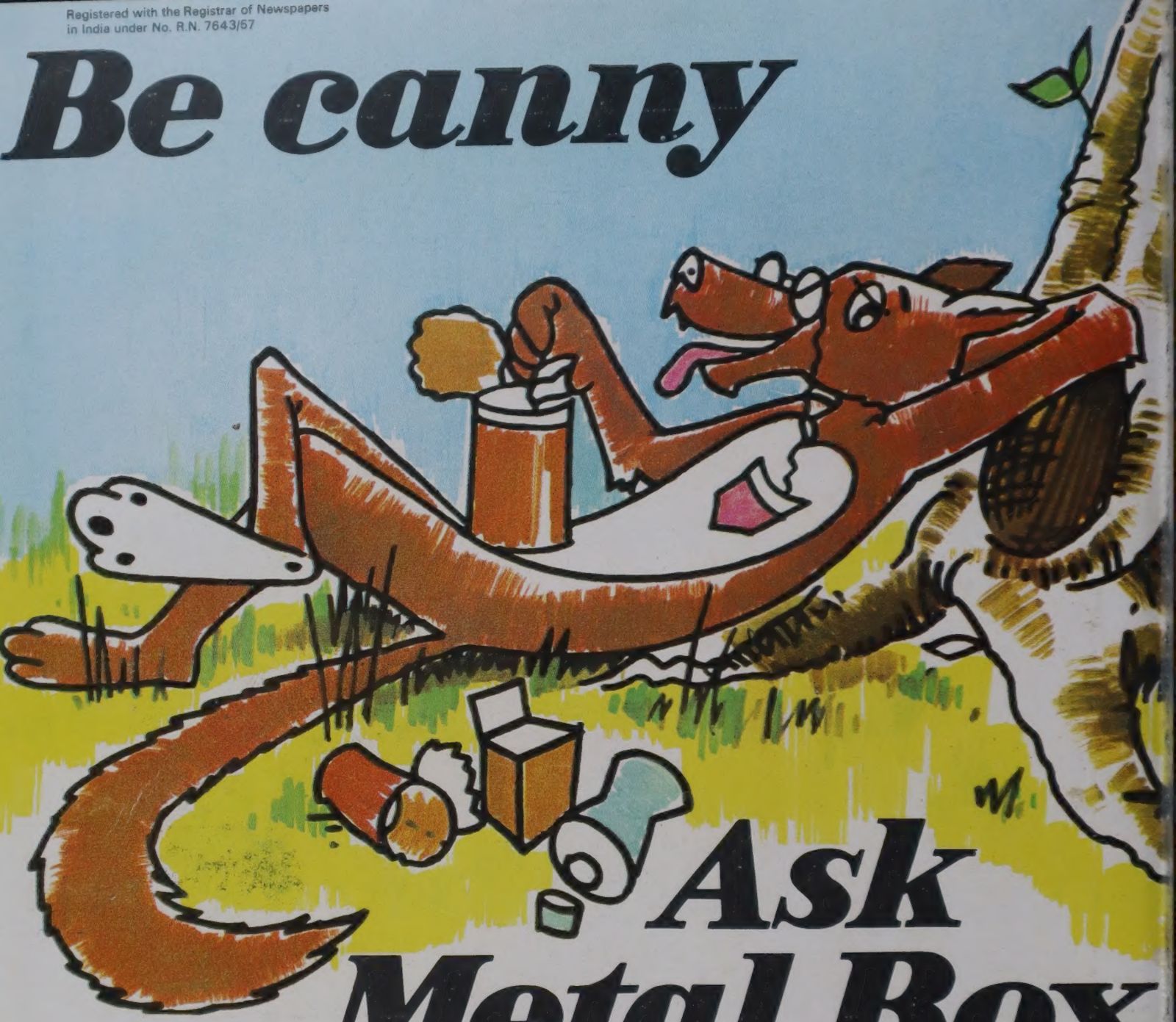

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